DEPARTMENT OF AGRICULTURE

AND

TECHNICAL INSTRUCTION FOR IRELAND

JOURNAL.

VOLUME XV.

[OCTOBER, 1914, TO JULY, 1915.]

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Vol. XV. **No. 1.**

DEPARTMENT OF AGRICULTURE

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Meeting of the Council of Agriculture—Vice-President's Address—The War and Irish Agriculture—The War and Ireland's Food Supply—The War and its Effects on Irish Farmers—Wintering of Store Cattle—Artificial Production of Vigorous Trees—Technical Education for Boys in London—Second Irish Egg-laying Competition—Crop Report—Fruit Crop Report—Warble Flies—Barley Cultivation in Denmark—Royal College of Science: Applied Chemistry; Electrical Engineering and Physics—War and Flax-growing—Early Potato Growing—Official Documents—Notes and Memoranda—Statistical Tables.

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No. 1

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CONTENTS.

NOTICE.

Communications respecting the literary contents of this JOURNAL *should be addressed to the Superintendent of the Statistics and Intelligence Branch, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion-street, Dublin.*

Communications respecting Advertisements should be addressed to ALEX. THOM & CO. (LIMITED), MIDDLE ABBEY-STREET, DUBLIN; *or to* LAUGHTON & CO. (LIMITED), 3 WELLINGTON-STREET, STRAND, LONDON, W.C., and not to the DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

COUNCIL OF AGRICULTURE.

The Twenty-sixth Meeting of the Council of Agriculture took place on Thursday, 20th August, 1914, at the Civic Exhibition Buildings, Dublin (by kind permission of the Committee of the Exhibition).

The Chair was taken at 11 a.m. by the Right Hon. T. W. Russell, M.P., P.C., Vice-President of the Department.

Their Excellencies the Lord Lieutenant and the Countess of Aberdeen were present during portion of the proceedings.

The following were present :—

Representing the Department :—The Vice-President ; Mr. T. P. Gill, Secretary ; Mr. J. R. Campbell, Assistant-Secretary in respect of Agriculture ; Mr. George Fletcher, Assistant-Secretary in respect of Technical Instruction ; Mr. J. S. Gordon, Deputy Assistant-Secretary in respect of Agriculture and Chief Agricultural Inspector ; Mr. T. Butler, Superintendent of the Statistics and Intelligence Branch ; Mr. J. P. Walsh, Clerk in Charge of Accounts ; Mr. H. G. Smith, Senior Staff Officer ; Mr. J. V. Coyle ; and Mr. W. Bowers.

MEMBERS OF COUNCIL, ACCORDING TO PROVINCES.

LEINSTER

John Bolger, J.P. ; Algernon T. F. Briscoe, J.P. ; Thomas M. Carew ; Patrick J. Carey, J.P. ; James G. Dooley ; Robert Downes ; Sir Thomas H. Grattan Esmonde, Bart., M.P., D.L. ; Colonel Sir Nugent T. Everard, Bart., H.M.L. ; William Field, M.P. ; Patrick Hanlon ; Michael J. Horan, J.P. ; Patrick J. Kennedy, J.P. ; James M'Carthy, J.P. ; Joseph Mooney, J.P. ; George F. Murphy, J.P. ; Patrick J. O'Neill, J.P. ; Charles H. Peacocke, J.P. ; Henry Reynolds ; William R. Ronaldson, J.P.

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MUNSTER.

Michael Ahern; John Bourke; Langley Brazier-Creagh, J.P.; Edmund Cummins, J.P.; Joseph Dwyer, J.P.; Patrick J. Hogan, J.P.; Most Rev. Denis Kelly, D.D., Lord Bishop of Ross; Michael Mescal, J.P.; Patrick Moclair; The Right Hon. Lord Monteagle, K.P., D.L.; Michael J. Nolan, J.P.; Edmond Nugent, J.P.; William O'Callaghan; David Leo O'Gorman, J.P.; Hugh P. Ryan; Michael Slattery, J.P.

CONNACHT.

Patrick D. Conroy, J.P.; P. J. Costello, J.P.; Rev. Joseph G. Digges, M.A.; John Galvin; John Lohan; Rev. P. J. Manly, C.C.; Rev. Philip J. Mulligan, P.P.; Robert P. Wallace, J.P.

Mr. H. G. Smith acted as Secretary to the Meeting.

The Minutes of the Twenty-fifth Meeting, 4th June, 1914, a copy of which had been sent to each member of the Council, were taken as read, and were signed as correct.

Apologies for inability to attend the Meeting were received from :—The Right Hon. Lord Clonbrock, K.P., H.M.L.; Mr. Thomas J. Byrne, J.P.; Mr. A. L. Clark, J.P.; Mr. Walter M'M. Kavanagh, J.P., D.L.; Captain J. E. B. Loftus, J.P.; Mr. W. H. M'Cowen; and Rev. T. A. Finlay, M.A.

The Vice-President delivered his address (see pp. 6 *et seq.*), in the course of which he explained that the Department had considered it desirable to summon a special meeting of the Council in order to confer with them upon certain important aspects of the situation created by the war, and especially with a view to considering the agricultural position of Ireland and its possibilities, and the methods by which these might be made use of to the fullest public advantage.

The Assistant-Secretary in respect of Agriculture read a paper (see pp. 10 *et seq.*) in which were placed before the Council various aspects of the subject which the Department desired to submit for consideration and discussion.

The Most Rev. Dr. Kelly, Lord Bishop of Ross (Co. Cork), proposed the following resolution, which was seconded by Mr. Hugh T. Barrie, M.P. (Co. Londonderry) :—

> RESOLVED : "That this Council endorses the action of the Department in issuing, on the outbreak of the war, a warning against the sale of breeding stock, and in recommending the retention of sufficient seed to sow a greatly extended area of grain crops, the economising of grain and other concentrated feeding stuffs by sowing new crops suitable for soiling in spring, and the saving of flax seed in districts where this crop is grown.

The Council also impresses on farmers, labourers and all persons having land suitable for the purpose to make provision for growing for household purposes cabbage and other vegetables suited for winter cultivation. In view of the uncertainties of war and the importance of leaving nothing to chance, the Council further resolves that its members individually take all steps in their power to impress upon occupiers of land the duty which devolves upon them to make immediate preparation, in the national interest as well as their own, for a largely increased area of tillage crops, especially grain and potatoes, necessary for the food of our people. Further, the Council appeals to the County Committees of Agriculture at their forthcoming meetings to adopt every possible means to start immediately and to promote these measures amongst the farmers and labourers of their respective counties."

(The addresses of the mover and seconder will be found on pp. 20, *et seq.*)

At the request of the Vice-President, Mr. Frank Barbour (Co. Meath) addressed the Council upon the position of the flax industry and Mr. R. N. Boyd (Co. Antrim) upon that of the pork industry.

A prolonged and well-sustained discussion upon the whole question followed, at the close of which the above Resolution was put to the Council, and was passed unanimously.

The Vice-President intimated that the Department had already done much in the direction suggested in the Resolution, and would see that every step was taken to carry out without delay the various recommendations made by the Council.

The Vice-President, on behalf of the Council expressed the thanks of the members to the Directors of the Civic Exhibition for having kindly placed the Concert Hall at their disposal for the meeting of the Council.

The Council adjourned at 5 p.m.

(During the day the Members of the Council were afforded the opportunity of inspecting the various Sections of the Civic Exhibition, including the agricultural, educational, and other exhibits organised by the Department.)

THE VICE-PRESIDENT'S ADDRESS.

My Lords and Gentlemen,

The Department have invited your attendance here in order to confer with you regarding an important aspect of the situation which has been created by the declaration of war between this country and Germany and Austria. In war time the question of the food supply is of paramount urgency, and it is in this connection that we to-day seek your assistance and advice. The developments likely to follow in the train of so momentous a situation as that in which we find ourselves, are such as may tax our resources to the utmost limit. It is an imperative duty, therefore, for us to take instant account of our agricultural position and its possibilities, and to consider in what way and by what means we may turn the talents with which we are entrusted to the fullest public advantage.

Ireland as a Food-producing Country.

Ireland is a food-producing country. Agriculture is our great and staple industry. Where, then, do we stand in the matter of food production? This is not the moment for any disquisition in economics, but the fact that, apart from live stock, our food imports exceed our food exports in value is a consideration which affords grave grounds for reflection, especially in view of what is perhaps the greatest crisis in the long and eventful history of these islands. There are, of course, many factors to be borne in mind when considering the relative position of exports and imports, and some of these may partially account for the discrepancy which I have just mentioned. But, still, making every allowance, there remains the fact that, in a sense, we consume more than we produce, and that we purchase many articles of consumption which it is within our competence as an agricultural community to produce. As has been well pointed out in the recently issued Report of the Agricultural Credit Committee: "A great deal of the indebtedness of the Irish farmer is for food and feeding stuffs, much of which could with profit be grown upon his own land." The question which Irish farmers will have forced upon them at this juncture is, what can they do to increase the volume of production, at a time when the ordinary channels of supply are largely interrupted, and when every article of common consumption must bear an enhanced value, not only from a personal, but also from a national point of view.

The Recent Increase in Prices.

Upon the declaration of war there was, as one might perhaps have expected, a great and sudden rise in prices. The Department, viewing this rise as being mainly due to panic on the part of the public, have not so far intervened in the matter, for the powers conferred upon the Board of Trade in regard to the regulation of prices are applicable to Ireland as well as to Great Britain. They have, however, made elaborate inquiries into the prices of food stuffs, both before and after the commencement of the war, and are satisfied that many of these prices were carried to a point which in all the circumstances was wholly unjustifiable. There has since been a reaction, and prices are steadily on the down grade. The question of intervention by suggestion or otherwise has consequently lapsed for the time being; but I may mention that the Department have made arrangements whereby they will be kept regularly informed of the prices of cattle feeding stuffs, and of a large number of the ordinary articles of consumption, and their action or inaction in this matter of safeguarding the general public will entirely depend on circumstances as they arise.

The Return to Comparatively Normal Conditions.

We are, I am glad to say, getting back to comparatively normal conditions. The trade routes are now to a large extent free, and are likely to remain so. The policing of the seas by our fleet has secured this freedom, and the institution of a system of cargo insurance, known as the "Government War Risks Scheme," is further tending to speed our shipping on its way. The truth is that the German flag is not now to be seen on any of the great waterways of the world. Such is the effect of sea power, and there is no reason to suppose that this state of affairs will not continue throughout the war. This means that there will still be a considerable influx of foods into the United Kingdom, though there will scarcely be the same volume of food imports, and certainly not of some particular articles of consumption, as obtains in times of peace. It must also be remembered that as the war proceeds there will inevitably be a large measure of unemployment throughout Great Britain and Ireland, and the demand for food stuffs will proportionately decrease.

The Need for Increased Production.

On the other hand there are articles which are bound to increase in price, and these are precisely those articles which the Irish farmer produces or is in a position to produce. For example, there will always be a market—and in spite of diminished purchasing power, which is a concomitant of war, there may be an

improved market for Irish cattle. At this point let me interject the assurance that Foot-and-Mouth disease has disappeared from the country. There is now only a single farm, with a few miles of the surrounding district—I refer to the last outbreak in County Tipperary—working out its period of quarantine. All the restrictions in Ireland with which we are forced to combat this evil will, therefore, be removed in the course of a few days.

But in addition to cattle there are other classes of live stock the value of which is certain to be enhanced. Whether the war be long or short, there will be a further abnormal demand for horses. There will also be an even greater opportunity than ever for Irish pig-breeders. Bacon—at least Irish bacon—threatens to become even more of a luxury than it is at the present moment. The price of this commodity has been abnormally high in the past, and the indications point to its being still higher in the future. It has been maintained in spite of the fact that the recent serious shortage in pigs has disappeared, the number now standing at what may be considered the normal level. The Department have appointed a small Committee to inquire into the cause or causes leading to this shortage, which at one time threatened the pig trade with disaster. The Committee will begin its sittings almost immediately, and it is to be hoped that the result of this inquiry will be the stabilising and further development of an industry which is of such great importance to the small farmers throughout the country.

Advances are also probable—I should say almost certain—in the case of butter, poultry and eggs. There is at ordinary times an open and ready market in Great Britain for all these articles, and the Irish farmer can, if he so desires, produce them in greatly increased quantities.

Stoppage of Supplies from Russia.

Russia comes next to Denmark in supplying foreign butter to the British markets; and the value of the eggs which it supplies to the United Kingdom is £4,700,000 as compared with imports under this head amounting to £4,800,000 from all other countries combined. It looks, however, as if the Baltic Sea, whence these supplies are borne, will be closed for some time to come. Of course, commerce is not easily baulked, and already one hears of the possibility of Russian trade being resumed with Great Britain *via* Archangel. But even if such exports are not prohibited by the Russian Government, there are factors which would tend to make this trade intermittent and uncertain; and there must necessarily be a great shortage in the supplies of butter and eggs coming from that quarter at least.

The Uncertainty of Imports from Denmark.

There is also this further consideration. The main supply of foreign butter comes from Denmark. Here things are, to say the least, in a very delicate position. The traffic between Great Britain and Denmark was suspended on the rupture of our relations with Germany, but it has nearly recovered itself, and ships freighted with Danish produce are now arriving regularly in British ports. How long this will last is quite another thing. Denmark is, no doubt, a neutral country, and it is to be sincerely hoped that its neutrality will continue to be respected. But we have seen how one neutral country in the neighbourhood of Germany has been treated, and one cannot reckon with any certainty upon Danish supplies continuing to come to England.

As to poultry I need say no more than that, great as the development has been in this industry in recent years, there is no conceivable reason why our output in this direction might not easily be at least doubled. This could be done without any great expenditure of capital, and it could be done by the small farmers and cottiers throughout Ireland.

I have purposely left it to Mr. Campbell to deal with the larger questions of agricultural production, such as the production of wheat and flour, of flax and of feeding stuffs for live stock.

The Safest Course to Pursue.

What I would say in conclusion is this. In my judgment the safest course for us to pursue is to act as if this war were likely to be protracted and severe. People will have their own views on this point, but my opinion—and I only give it for what it is worth—is that the finances of the nations involved, and the general paralysis of industry which conscription entails, will prevent any lengthened continuance of warfare on so huge and unprecedented a scale. Wise men will, however, so act as to be on the safe side, and we must leave nothing to chance. The Department have convened this meeting with a view to securing assistance and advice in a great emergency—assistance and advice such as you were specially constituted by Parliament to give to the Department. The Council have been supplied with facts and figures bearing on the actual agricultural situation in both Great Britain and Ireland. The time is one in which the whole country will look to you for light and leading, and I am convinced that it will not look in vain. Our farmers have before them a grave responsibility and, let me add, a great opportunity. They must wake up and realise the vast importance of the share which they are called upon to take in furthering the vital interests of the community of which they are a part—a community which is engaged in what is perhaps the greatest enterprise that any civilised community has yet been called upon to undertake.

THE WAR AND IRISH AGRICULTURE.

Memorandum submitted by MR. J. R. CAMPBELL, *Assistant Secretary in respect of Agriculture.*

War has come upon the country so suddenly and so dramatically that it is somewhat difficult to foresee how our agricultural industry is to be affected by it. Accustomed as we have been to a long reign of peace and to unfettered trade in food stuffs, it is with difficulty that we bring ourselves to think even in terms of the present state of affairs. Moreover, the situation has been greatly complicated and obscured by the temporary dislocation of transit facilities. The effect of such dislocation was, in many cases, taken to indicate a condition that would remain more or less permanent during the war. On the outbreak of hostilities the stock of grain and other food stuffs for stock in the country was unusually low, and a number of farmers were faced with the alternative of buying feeding stuffs at a high price or selling some of their stock. For a brief period there was uncertainty, and rapid fluctuations in prices. We are now, however, able to review more clearly our resources and potentialities, and are met to-day to take stock of the situation, to hear the views of representatives from every county, and to decide in what way the Department, through its county and other organisations, can best advise farmers in their own interests as well as in the interests of the country. It must be borne in mind that we have to consider not merely the immediate future but a period that may be extended far beyond our present conceptions. Whatever decision we arrive at will be vigorously advocated throughout the country. Our staff of Agricultural Instructors have been recalled from holidays, and are assembled with us to advise how, under the County Committees, they can best give effect to our policy.

Let us first consider how matters now stand. We have to congratulate ourselves that we annually supply Great Britain with food stuffs, exclusive of drink, to the value of £24,000,000.* This is far

* Ireland, in short, is, amongst all the countries of the world, the chief supplier of food stuffs to Great Britain. "Last year the food and drink stuffs produced in Ireland and sent to Great Britain amounted in value to £30,000,000 sterling. The Argentine was the only food supplier of Great Britain which equalled this amount. The United States came next with 28 millions, British India with 21 millions, Denmark 21 millions, Canada 18 millions, Russia 17 millions, Australia 14 millions, and the Netherlands 13 millions. In some particulars Ireland's exports of food to England are far in excess of that of any other country. In meat she supplies one-third to one-half the total quantity coming from all the countries of the world put together, and she sends more than one-third of the eggs and more than one-sixth of the butter. . . .
The value of the export of meat of all kinds, living and dead, including beef, mutton, bacon, and poultry, has increased from £16,000,000 in 1904 to £23,000,000

short of what is possible and desirable, and, moreover, we have to set against it the fact that we pay annually for imported wheat about £3,100,000 ; for flour, £2,600,000 ; for maize, £3,500,000 ; for bran and pollard, £300,000 ; and for other foods for stock approximately £1,000,000. In times of peace, we have at this Council repeatedly dealt with these figures ; and the view was adopted that owing to the trend of foreign competition we ought to concentrate as far as possible upon the production and export of butter, bacon, and eggs, as well as of live stock. We came also to the conclusion that to carry on these industries successfully and to reduce our bill for foreign feeding stuffs, more tillage was necessary.

Ireland's Imports of Food Stuffs.

In pursuance of this policy, schemes of agricultural development were carefully devised and persistently and energetically administered. These schemes have now been in operation for several years, and it is well to ask ourselves what has been their effect. I think we may rely on the opinion of our friends in Great Britain who have been buying and dealing in our produce, as well as of persons in that country who, by visits to Ireland and by other means, are in a position to pronounce upon our work. By them it is generally admitted that a great improvement has taken place in the quality of our exports during the past decade. At home we have abundant evidence of this in our live stock, in our egg industry, in our butter and cheese, in the saving which has been effected by the intelligent use of manures, feeding stuffs and seeds, in the quality and produce of our crops, in the preparation of our goods for market, and in many other directions. But whether we take the opinion of our friends in Great Britain, or view the situation ourselves, it is abundantly evident that one of the chief improvements has been in our cattle. This cannot be satisfactorily explained on the ground that undue attention has been paid to this industry. Other industries have been proportionately fostered so far as our resources would allow. The fact is that the natural conditions of the country are such that of all our industries live stock has responded to the application of funds for its development more than some others. Why is it that money spent in stock-raising meets with so much success, and why is it that Ireland continues to devote so much attention to this industry ?

Beneficial Results from Agricultural Schemes.

The chief reason to my mind is to be found in the mildness of

last year. The annual value of the poultry and eggs going to Great Britain has increased by a million sterling in five years."—*(Extract from Address given by Mr. T. P. Gill, at Belfast, 5th August, 1914.)*

our winters, which makes it practicable to raise stock here at less cost than can be done in Great Britain. There the winters are more severe, and expensive buildings have to be erected for the protection of stock at seasons when in Ireland the animals are grazing in the fields. Tillage for the provision of winter provender in Great Britain is an absolute necessity, while with a minimum of tillage and of buildings we can rear live stock successfully—in many districts allowing the animals to remain in the open fields all through the winter. Indeed, as our experiments have shown, it does not pay to go to the expense of housing store stock in our grazing districts. So long, therefore, as the British farmer can take our store cattle, so long as the prices realised for them bear an adequate ratio to the cost of imported food stuffs, and so long as the production of grain crops for human consumption is not a necessity, so long will Ireland tend in the main to be a stock-raising country.

Reasons for tendency to Stock Breeding in Ireland.

But the conditions may change. During the last year or two the appearance of foot-and-mouth disease has seriously threatened the free export of store cattle, and has compelled the British farmer to take to the rearing of his own. Moreover, with the country at war, no one can say that the production of food for human consumption may not become absolutely essential. In either case, tillage may become a necessity ; for though we can rear stores successfully in open fields, the winter pasture, of itself, will not fatten them.

I have given, as one of the reasons why Ireland is a stock-raising country, the fact that we possess in the mildness of our winters an important asset, of which our farmers take considerable advantage. The conservatism which characterises the Irish farmer, as well as agriculturists the world over, is of course an important factor too. To till the land entails greater risk, more labour, costly seed and manure, and therefore the investment of money. Tillage farming is an anxious occupation, calling for hard work ; and, for success, constant attention to detail. It requires a great effort for farmers of this generation to make such a change as is involved in breaking up pasture land. Moreover, Irish farmers are well skilled in the buying, selling, and grazing of cattle. It is a business they understand, and it is easy to appreciate and even to sympathise with their partiality for it.

The present crisis, however, appears to offer a favourable opportunity of renewing our appeal to farmers to try more tillage, and so to rely more on themselves and less on British feeders who now take their store stock. We do not propose to make this appeal on the

ground that the war will bring high prices for grain and for all classes of food stuffs, for as no one can say what will be the result of the war, so no one can predict its effect on prices. It is wiser to base our appeal primarily, on the ground that the farmer, having been put in possession of the land, owes it to the community to see that it is used at this time to the greatest national advantage ; and, secondly, on the ground that the farmer's duty to the country is likely to coincide with his own interest.

Grounds of Appeal to Farmers in present crisis to Increase Tillage.

That well-tilled land yields more national wealth, in the form of food and men, than the same land under grass is a well established proposition. but this does not overcome the difficulty of convincing the Irish farmer that individually he would be better off too by having more tillage and less pasture. As an illustration of the national gain from tillage let me give you the following authentic figures about an Irish farm of fifty statute acres, not specially favoured as to soil, climate or situation. For five years this farm was in pasture, and during that period it yielded annually an average of £2 per acre, or a gross return of £100. The labour employed was one man. For the last five years this farm has been tilled, with the exception of five acres of permanent pasture. During this period the average gross return has been £15 per statute acre, or a total of £750. Instead of one labourer there have been five, together with casual workers ; and instead of £40 a year, £300 was paid in wages. Moreover, the total income has substantially exceeded the total outlay. Cultivation, however, if it is to be successful, must be intensive. Farmers must be prepared to expend more capital and to employ more labour, to use suitable manures, and to sow good seeds. It has to be remembered that it is the full crop that pays, since the cost of tilling, seeding and weeding is not more, indeed it may be less, for a good crop than a bad one.

To-day we must also consider specifically what, in certain eventualities, farmers may be called upon to do as a result of the present crisis. Though we have the utmost confidence in our forces, both on land and on sea, it is the clear duty of those who are not fighting, and particularly of those who occupy the land, to see that nothing which would tend to strengthen the hands of the authorities is left undone. We must not, therefore, consider the subject of our food supplies on the assumption that the war will be of short duration or that it will terminate overwhelmingly in our favour. It is fitting that we should deal with the question on the hypothesis that food may be dear and scarce.

Let us then consider first the position of our live stock and our

policy in regard to it. We export annually to Great Britain three-quarters of a million head of cattle, fat and store, and it is reassuring

Present Position in regard to Live Stock Industry.

to know that at present we have still the greater number of these animals on hand, irrespective of what we require for our own consumption. It is estimated that just at present, owing possibly to the recent foot-and-mouth disease restrictions, we have about 150,000 more than the usual supply. Our annual exports of cattle amount to about one-seventh of the whole, while for home consumption we require but a quarter of a million head—roughly, about one-third of the number exported. Briefly, therefore, we may say that we dispose annually of one million head of cattle without depleting our stock, which is maintained at about five millions.

Of sheep we export approximately the same number as of cattle, and of this total we still have on hands the most substantial part. In the case of pigs, we have recently been faced with a diminished supply, for which many causes have been assigned. In this connection we shall await with great interest the public inquiry which was announced this morning by the Vice-President. Our pig population in 1913 was down to about one million, or twenty per cent. below the average of the last ten years. Fortunately, the recent census enables us to state that there has been a considerable increase during the past twelve months, and that we are now back to the normal as regards the number of these animals in the country.

One of the greatest dangers of the present situation, should it lead to a material increase in prices, is the probability that it will

Danger that Increased Prices will induce Farmers to Sell Breeding Stock.

induce farmers to dispose of profitable breeding stock, particularly of cows, pigs, and sheep, or to neglect to reserve sufficient young females for breeding purposes. This is a proceeding which, however justifiable to meet extraordinary famine conditions, would seriously affect our industry for years to come, and would, in the event of a continuation of the present crisis, greatly accentuate the national difficulty. At the outbreak of the war the Department issued, through the Press, a warning on this subject. There is urgent need to repeat it in the most emphatic manner, and it is hoped that no such short-sighted policy, however great may be the temptation, will find favour with our farmers. The need for this warning is very evident if the information to hand be correct, viz., that recently, when prices for pork suddenly rose from 54*s.* to nearly 70*s.*, numbers of sows suitable for breeding were sold off. This policy, as has been said, is detrimental to the country and to the farmers themselves. It is also opposed to the best interests of the bacon curers, to whom we would appeal for co-operation in discouraging the practice. Bacon

is one of the animal products which, as a result of the European complications, is likely to maintain its price. From the point of view of the needs of the country it is to be remembered that the breeding of pigs is one of the quickest and surest ways of increasing the food supply ; and, seeing that pig breeding offers direct encouragement to the farmers themselves, while at the same time helping very materially towards the maintenance of human food supplies, it is eminently desirable that every effort should be made not merely to maintain, but greatly to extend, this industry.

In this connection attention is specially directed to recent experiments by the Department on the feeding of pigs with raw foods. One of the objections frequently urged against keeping pigs is the trouble and expense entailed in the boiling of food. It is by no means certain—in fact, the experiments indicate the contrary—that the cooking of meal is necessary, and all those interested in the matter are strongly advised to study the results of the experiments, and to give uncooked meals a fair trial with a view to the saving of labour.

Owing to the early age at which lambs come to maturity, the breeding of sheep, as well as of pigs, is an industry which at this stage is deserving of special attention.

Position in regard to Dairy Products.

In the case of dairy products we cannot, unfortunately, look forward to an immediate increase in the supply. Having little tillage, we have consequently little winter dairying. Week by week from this date onwards we must face the prospect of a diminishing supply. In addition to being exporters of butter, we actually become importers of this article in winter. Under existing conditions the great majority of our cows calve in the spring, and to make any alteration in this system would require much time. Here let me emphasise an important fact, viz., that early calving is one of the most essential conditions to successful dairying, for the Department's experiments on winter dairying have shown nothing more clearly than that cows which calve in winter yield far more milk in the year, by reason of the flush that comes in spring, than spring calvers. Moreover, winter calves are more easily reared. The advantage of weeding out unprofitable cows by means of Cow-testing Associations is coming to be realised, but it is well to point out that a cow rejected on her year's performance as a spring calver might be accepted if she calved in winter.

Something, however, can be done to increase the available milk supply during the coming season. Imported feeding stuffs may be limited and costly, and it accordingly becomes the duty of farmers to produce home-grown food in the form of autumn sown crops. For

many years the Department's Instructors have pointed out the advantages of such crops for late autumn and early spring feeding. With the demand for milk and butter, and the probable high cost of imported feeding, combined with the need for conserving home-grown grain for food and for seed, the urgency of providing green food for winter and early spring cannot be over-estimated. The harvest is early, and before the winter sets in, a portion of the stubble and potato ground can be prepared for the sowing of such crops as rye, vetches, hybrid turnips, rape, and Italian ryegrass. For years the farmer has been advised to test such crops. Thousands of demonstrations have been made by the Department's Instructors. It now becomes the duty of those who have the facilities, to cast aside old habits and prejudices, and to make an effort to help themselves and the country. Objections have been urged that the sowing of stubble and potato ground with green crops would endanger next season's root crop; but if the preparation of the land is taken in hand at once, and if a portion only of the stubble be treated as suggested, the risk of such interference is not one that farmers should hesitate to take. To sow turnips or rape when turnips are to be sown next year is not advisable on most soils. One does not, of course, forget the fact that it is much easier to succeed with winter crops in the south and west than in the north; but even there, in times of need, something could be done. A new leaflet on catchcrops, indicating the simplest procedure possible, has been recently circulated; copies may be had on application to the Department. It should and will be amplified to suit local conditions by each County Instructor, who may be relied upon to do all in his power to assist farmers in this, as in other matters.

Advantages of Autumn Sown Crops.

It is, of course, possible that if, as we expect, all goes well on the sea, food stuffs for man and beast, from the Americas and elsewhere, that would normally find their way to the Continent, may be diverted to our shores; but as we are all anxious in this crisis to contribute to the national safety, it is not too much to ask that the farmers of this country, for whom the State has done much, should embark in an undertaking which, while making for the national well being, may well prove remunerative to themselves.

The Poultry Industry.

The poultry industry has developed enormously in recent years. The instruction provided has been readily availed of. Owing to the supplies from the Continent to Great Britain being interfered with, the prospect is excellent, and an increase in stock, by keeping pullets, offers a good investment for labourers as well as for farmers. The scarcity of meal in the country has already resulted in the extensive sale of young birds that might have been profitably retained.

Turning now to the tillage crops, it is reassuring to know that, with the exception of hay and turnips, these promise to be well up to average in yield and over the average in quality. Harvesting is now general, and unless there is an extreme change in the weather conditions, there is every prospect of the crops being garnered in first rate order. Particularly encouraging from the point of view of our food supply is the fact that the potato crop is unusually free from blight and promises to yield an abundant supply of sound and reliable food. Some important considerations have to be faced in connection with these crops. When harvested what is to be done with the produce ?

Barley.

Barley, wheat and oats are in many districts, under normal conditions, threshed and sold off immediately. A large proportion of the barley is bought by maltsters, dried and stored, and later on malted. The question of the supply of this cereal for seed or for food need not interfere with the ordinary commercial procedure, since the crop is stored in the country. On consideration of all the facts of the case, the prospects for barley, of which we this year have 172,000 acres, are extremely good, and there can be no hesitation in recommending an increased sowing next year on land suitable for this cereal. As the result of numerous experiments, the varieties recommended have been reduced to one or two, and the pure cultivations which the Department are constantly making of these varieties are now generally available.

Wheat.

It is more difficult to advise as regards the sowing of wheat. To grow the wheat and flour that we import (viz., 600,000 tons), would require three quarters of a million acres, and 60,000 tons of seed, whereas our present crop covers but 37,000 acres, and would yield only about the same number of tons. Should there be any interference with the supply of bread stuffs, it would clearly be the duty of farmers to retain as much as possible of the seed now available, which would sow nearly 500,000 acres—roughly the area now under potatoes, if we exclude some of the land unsuitable for wheat growing. The lands suited for wheat are limited, but, if sown early enough, remunerative crops could be grown upon land now devoted to other cereals. Since, then, nothing should be left to chance, it would obviously appear to be our duty to sow a much larger area of wheat during the coming year than has heretofore been the custom.

Oats.

The limitations as to soil which apply to the profitable cultivation of barley and wheat do not operate in the case of oats, as this crop can be grown on nearly all our soils. At present we grow slightly over one million acres. In view of the usefulness of the crop as a food for

both man and beast, and of the fact that we import three and a half million pounds' worth of maize, as well as one million pounds' worth of other feeding stuffs, mainly for the maintenance of stock, it is clearly the duty of farmers to be prepared to sow a greatly increased area of oats next season. It would require double this year's area to supply sufficient oats to render us independent of imported feeding stuffs for live stock. Obviously, such a large increase would entail a reduction in the number of stock, but it would provide for a threatened emergency; it would allow of stock being better fed; it would provide an increased supply of food for pigs and poultry and it would greatly reduce the feeding stuffs bill.

Particulars of this year's potato crop have been made available within the past few days, and indicate that we have 583,000 acres.

Potatoes.

The yield is estimated at 3,750 000 tons, and—provided the season finishes as it now promises, and disease, which so far has been practically absent, does not make its appearance—there should be of this crop sufficient not only to supply our own needs, but to allow for export. Last year it was estimated that there were available for export from Ulster alone about 200,000 tons. The potato is a crop on which the greatest dependence for food can be placed. Indeed, few methods of utilising the soil return more food for human consumption. What is of special importance in such critical times as the present is the fact that it is ready for use before any of our other crops. It would be well, therefore, not only to increase the area under potatoes in the coming year, but especially to see that plenty of seed of the earlier varieties is kept, as even in normal circumstances such seed is costly and difficult to procure. Indeed the immediate question in regard to all these crops is that of keeping sufficient seed. This duty applies with special force in the case of small farmers who, if they now sell their seed, may find it extremely difficult and costly to procure a supply when the season for sowing arrives.

One other field crop which is used for direct human consumption can be got ready before the early potato, and that is cabbage.

Cabbage.

Planted now, certain varieties will be ready from December onwards and if seed be sown now, the young plants could be put out in October and be ready in early spring. Farmers, and especially labourers and persons in the vicinity of towns, ought to see that they have a plentiful supply of this vegetable for culinary purposes.

Other vegetables which can be recommended to those having gardens and plots of land, to be sown for spring use, have been dealt with in a special leaflet which has been issued by the Department, and of which copies are available for those who write for them.

The fruit crop grows in extent year by year, and there is a prospect ot a good return of apples. Unfortunately, however, the difficulty of getting sugar, partly due to transit facilities and partly to the fact that much of it comes from the seat of war, is likely to affect adversely the preserving of the soft fruits, which will in turn affect the jam-making industry. The fine season has produced an excellent crop of blackberries, now about to be gathered. For some years the Department have been organising the picking and sale of this fruit, but reports now to hand indicate that the crop may not this year be much in demand at jam factories. Certain fruits, however, can be preserved without sugar, and householders would be well advised to put into practice the art of preserving fruits now being demonstrated in the Department's Agricultural Section in this Exhibition.

Fruit.

There is another crop, viz., flax, to which reference must be made. Though not used as food, it is of extreme importance to the country. Three-fourths of the flax used by Irish spinners is imported, mainly from Russia, Belgium, and Holland. That there will be a keen demand for flax in Ireland, arising out of the existing situation, is highly probable. Some 50,000 acres are grown, mainly in the north of Ireland. The seed is obtained from Russia and Holland, and the prospect of getting the supplies next year from those countries is not promising. Irish-saved seed has been used experimentally with fair success; and on the outbreak of war the Department issued a notice in the northern Press advising farmers to save as much seed as possible. Steps will, of course, be taken to ascertain at the earliest opportunity the prospects of procuring seed from the usual or from new sources of supply. So long, however, as Holland is not involved in the war, and the seas are open, we may count on seed from that country.

Flax.

The dominant part played by Ireland in providing rye-grass seeds to Europe, as well as the United Kingdom, is, perhaps, not well known. In the north of Ireland extensive areas of rye-grass are grown for seed, which is bought, cleaned, and exported by a number of Irish firms. The war is likely to interfere seriously with this trade, and consequently to curtail the demand for this year's crop.

Rye Grass.

It is clear that the whole question of the food suppiies of this country is one calling for most careful consideration by our farmers. The discussion of the subject to-day by the members of the Council will, I am sure, do much to assist in drawing public attention to a matter of such vital importance.

THE WAR AND IRELAND'S FOOD SUPPLY.

Address given by the Most Rev. Dr. Kelly, *Lord Bishop of Ross.*

Your Excellencies, Mr. Chairman, Ladies and Gentlemen,—I rise to propose a resolution on the lines of the address delivered by the Chairman and of the paper read by Mr. Campbell. As they have developed the policy so clearly, it will not be necessary for me to make a long speech. I will begin by reading the resolution :—

Resolved : "That this Council endorses the action of the Department in issuing on the outbreak of the war a warning against the sale of breeding stock, and in recommending the retention of sufficient seed to sow a greatly extended area of grain crops, the economising of grain and other concentrated feeding stuffs by sowing now crops suitable for soiling in spring, and the saving of flax seed in districts where this crop is grown. The Council also impresses on farmers, labourers, and all persons having land suitable for the purpose, to make provision for growing for household purposes cabbage and other vegetables suited for winter cultivation, and in view of the uncertainties of war and the importance of leaving nothing to chance, the Council further resolves that its members individually take all steps in their power to impress upon occupiers of land the duty which devolves upon them to make immediate preparation, in the national interest as well as their own, for a largely-increased area of tillage crops, especially grain and potatoes, necessary for the food of our people. Further, the Council appeals to the County Committees of Agriculture at their forthcoming meetings to adopt every possible means to start immediately and to promote these measures amongst the farmers and labourers of their respective counties."

The outbreak of this dreadful war has stirred the minds of civilised peoples more than any event that has occurred in our time. But the horrors of war and its sufferings are intensified beyond the power of thought if war be accompanied by want of food, or even by scarcity of food. We, as a Council of Agriculture, are charged by statute with the duty of seeing that the land of Ireland is turned to the best possible advantage and, therefore, we have the duty of looking after the production of food in this country, both for man and for beast. As Mr. Campbell has explained,* it has been the settled policy of the Department and of this Council for many years past to increase the area of land in Ireland under the plough, and to lessen the attention people pay to the production of store cattle. Mr. Campbell has argued that question to-day; it has frequently been argued before. I have inflicted myself on you more than once with that argument; I have made speeches in the country and written a little booklet on the subject, and, therefore, I may, perhaps, claim the right of addressing you to-day.

* See pages 10-19.

The area under wheat in Ireland has fallen very much for many years past. Mr. Campbell has stated that in order to feed our own people we would require three-quarters of a million acres of wheat. When I was a child this country did sow half a million acres of wheat, but the sowing is now down to 37,000 acres. He claimed that the area under oats should be increased by one million acres. In my childhood the country grew over two million acres of oats, whereas now it grows only one million. So Mr. Campbell has claimed no more than that we should return to what the oldest amongst us saw ourselves when we were children He also claimed an increase in the area under potatoes. That area is now 583,000 acres? When I was a grown-up lad, running around, in 1861, Ireland grew over one million acres. Therefore, you see we are not advocating a new or a strange policy. But the position to day differs in one aspect from that of the time of which I speak. Ireland in those days depended large'y on the exportation and sale of its crops from the tilled land. We advocate to-day in the first place, the raisi g of the food for our own people. That is our first consideration. Of course we hope we may have some left over for export, but we are concerned to-day more directly with the feeding of the Irish people. We hope, and have good grounds for hoping, that the Fleet of the United Kingdom will hold the supremacy of the sea; but, as my resolution states, there are chances in war. The god of war is often a very arbitrary individual, and when we commit ourselves to the arbitrament of war we must be prepared against the off-chance.

Decrease in Tillage in Ireland.

Now let us get this thought well into our minds, and try also to impress it on the country generally—what exactly would happen if the Fleet of our enemy succeeded in getting control of the Atlantic Ocean, even for a short period? Mr. Campbell has told you that we import at present, in order to get our bread—the bread that you and I ate this morning—£6 000,000 worth of wheat and flour. The wheat that we grow in the country would make bread for the people for exactly three weeks and no longer; so what is going to become of us for bread for the remaining 49 weeks of the year? The potato crop this year is good, and so long as we have potatoes we shan't starve; but if we have to turn on the potato crop for our sole food I am afraid there would be a shortage by Christmas Day. But, in any case, you see that you are straight up against this question of whether we are to have wheaten bread or not. We grow wheat only for three weeks' bread; we have to import more than six millions' worth of wheat and flour to feed us for the remaining 49 weeks. Well, that is an absurd position.

Limited Food Supply now Produced.

Long before we had any fears of this horrible war I had put forward that view. There is a little pamphlet* of mine, to which I have already referred (reproducing an address delivered under the chairmanship of Lord Monteagle at the Munster-Connacht Exhibition in Limerick, eight or nine years ago) in which I have propounded this very doctrine. At that time I never thought—indeed, none of us thought—that in a civilised world we could be involved in the horrible condition in which we now are. We cannot see into the future; but, while I hope things will be well, there must undoubtedly be great suffering and great shortage of food. We ought to get that fact well into our minds. We saw the other day that two large German food ships were seized by our navy as prizes of war. That food has not reached Germany, and never will. If our food ships were seized by the enemy as prizes of war, and hunger came, then we should have music. So let us consider how best to provide against such an awful contingency. I need not go into details. Mr. Campbell also pointed out to you that we are in the very same trouble as to feeding our cattle, our pigs, our poultry, and even our horses. We imported last year, 1913—the figures have just been got together—£4,100,000 worth of maize, £600,000 worth more than Professor Campbell mentioned—his figures being based, I understand, upon the average of ten years. The amount is going up every year, and it was £4,100,000 worth last year.

Now if the import of that maize were, from any cause, to cease the milch cows could not be fed next spring, hence the need of sowing catch crops in order to make up for the shortage of grain foods. My resolution, therefore, suggests, first, thrift and economy in regard to the food of the country; and, secondly, the production of a greater quantity of food. I think we might very well take a leaf out of the book of Belgium, which has shown itself a brave little nation. In this, I speak of what I know, because I tramped in Belgium on foot from field to field. That country is barely a third of the size of Ireland; its soil is poor; there is hardly an acre in Belgium that could produce as good a crop as an Irish acre. There are between seven and eight millions of people on that small area, yet they produce in that country, out of that area and that poor soil, seven-eighths of the food they consume, while they export food stuffs to the amount of £20,000,000 a year. I saw by the newspapers since the war broke out that in France at the present time there is food enough for the whole people and for their armies for over twelve months. If war broke out on the 1st of May in this country, and if

Examples of Belgium and France.

* "Tillage," *published by the Catholic Truth Society of Ireland, Dublin. Price One Penny.*

our food ships were captured in the ocean, how long would it take to have a famine in Ireland ? It would not take a month ! We had not on the 1st of May in Ireland the stuffs to prepare our customary meals for a longer period. The people would have to turn to slaughtering the animals and living on fresh meat. There would be no bread, no potatoes, no grain foods. That is a most ridiculous position, and it would be much safer to have our food stacked in the haggards, as in Belgium and France.

Mr. Campbell suggested more than once that it was the duty of the occupier of the land to produce food, and to till the land. Now, on that point, you will pardon me for a short, half-theological, half-legal disquisition. The word "ownership" has a very vague meaning in the minds of most men. Ownership is of a great many kinds. It may be absolute and complete, as ownership in something that you make with your own hands, and which you are at liberty to use or to destroy just as you please. That is absolute ownership. But most ownership is limited by conditions, and you are not free to destroy or abuse ; you are bound to use. There are certain things in which there may be no ownership ; there are other things in which there may be only a very modified ownership. It is quite clear that we cannot get ownership in the air we breathe or in the sunshine. When we come to the question of land, clearly there can be no absolute ownership in land. A man is not free to use or to abuse his land, he is bound to use it. He may not destroy his land, for that land was given by God for the subsistence of the people, of the nation. That does not mean that every individual is to have a piece of this land ; that system would not work. But it means that those who occupy the land are bound to use that land, in the first place for their own benefit, and in the next place for the benefit of the nation.

No Absolute Ownership in Land.

False fundamental ideas lead to a great deal of mischief. I am old enough to remember when there was a notion in this country that the owners of land were absolute owners, and that they could do what they liked with the land. They were fortified in that notion by their legal advisers ; and they came to grief because they held a false principle. I want to warn the farmers of Ireland—and all my sympathy is with the farmers ; farmers and fishermen make up the majority of my flock—I want to warn them against taking up this false idea of absolute ownership in their purchased-out lands. They are bound to use that land for feeding themselves and for the feeding of the nation. If they show a selfish policy in trying to use the land for

Farmers must Use their Land for Benefit of the Nation.

their own benefit only, and to the detriment of national or neighbourly interest, or of the wider interests of humanity, then it would be the duty of the nation to step in and deprive them of that land, and to create some new system by which the land could be used for the benefit of the nation. I say that much in support of what Mr. Campbell has said, for I think it a very necessary thing that we should all have right ideas on fundamental questions of that kind. I therefore sincerely hope that the farmers and the labourers of Ireland will utilise the land, especially at this critical period, for the public benefit as well as for their own. War time is a time when men are called upon to make sacrifices they have to sacrifice their money, the'r comfort, their convenience, their very lives. Many of our countrymen are in the army and in the navy. For the last week I had calling upon me a stream of women—mothers, wives, sisters, and even the sweethearts—of young men in the navy. These men are all fighting; we hope that victory will descend on their banners; but it is for us at home to do our part in this great national crisis.

Need for Additional Employment on Land.

Again, Mr. Campbell alluded to the fact that many men are being thrown out of employment. That occurs in the cities, in industrial areas. While they are losing industrial employment in those areas, is it not a kind and generous and national and proper thing that the amount of employment on the land should be increased? We have heard already of some of the firms in Belfast closing down owing to the war, and no doubt many men in Belfast and other parts of Ulster, as well as in Dublin and in other cities, will be thrown out of employment; therefore, the more we can open up employment on the land the better. We are all glad to think that the Ulster Volunteers and the National Volunteers will join hands to save the shores of Ireland against any foreign enemy. The farmers, whether they be Ulster farmers or whether they be Southern farmers, ought to do what they can to lessen the strain of unemployment by giving more employment on the land. I am afraid I have gone too far. But these are the views that I have held for many years. A crisis has now come, and we call upon our landholders to rise to the crisis. We do not ask them in this matter to make sacrifices, because they are in this happy position that what will benefit humanity, the United Kingdom, and Ireland, will also benefit the individual farmers themselves. I have much pleasure in moving my Resolution.

THE WAR AND ITS EFFECTS ON IRISH FARMERS.

Speech by Mr. Hugh T. Barrie, M.P.

Your Excellencies, Mr. Vice-President, and Gentlemen,— I gladly second the resolution which has been so eloquently put before us by the Bishop of Ross. It is not, sir, the first time that this Council has had the pleasure of listening to his eloquent voice. It has profited by the words of wisdom which he has contributed to our debates in former years, but I do not think that he has ever addressed us with more acceptance, with more moving force, than in the speech which he has just delivered. If I might for the moment speak as the representative of an extremely northern county, I would say that we there, as you here, and our friends from the south and west, have regretted that it has become necessary for this country, in honour and in the spirit of liberty which has ever characterised our empire, to embark on a great war. While we deeply regret and deplore all the hardships which it necessarily involves, not only the fine brave men who have gone into the field but to their dependents who are left behind, one feeling remaining with us is that our country had no option, that she has embarked upon a duty which was obvious to every good citizen, and that, please God, we are going to carry our mission to success.

As the Bishop reminded us, war involves sacrifices, and it involves hardship. We are prepared for these ; we are alive to the self-denial which is our first duty, and we want to-day, as men with some claim to common sense, to take stock and to consider how we can lessen the hardship, how we can safeguard against the actual sufferings, that may possibly devolve upon those less able than we to protect themselves. I think, sir, that the resolution which has been presented to you by the Bishop covers certain valuable suggestions which will commend themselves to every agricultural county throughout the island.

Value of Steps Taken by the Government.

Much has been said by Mr. Campbell with regard to the problem that presents itself to us at the present time. He has referred, and you, sir, have also referred to the sudden advance in the cost of feeding stuffs which followed the declaration of war. After all, that is human nature repeating itself, and I desire, as a Unionist member, at once fully to acknowledge the wisdom and farsightedness of the

steps which the present Government immediately took to checkmate and to prevent loss. I am happy to think that already the unreasonable prices immediately put upon important food-stuffs have been checked, and that the prices have to a certain extent reacted. As one who has some knowledge of business, I would desire to express my opinion for what it is worth when I say that I do not believe that the recent prices were justified, can be justified to-day, or are likely to prevail in the future.

You, sir, have referred to the good work in this direction that has been already accomplished, but something more than that has been done by the Government. We have had for the first time in British history the Government of the country—with the full association, concurrence, and approval of all political parties—agreeing that the Government themselves should undertake a great duty previously left to private enterprise, and not always conducted on economic principles—I refer to the guaranteeing of war risks insurances. No finer tribute has been paid to our navy than the fact that they began by charging five per cent. last week; and at once they reduced it to four per cent.; and we are all glad to learn that the rate is now down to three per cent. It is one of the best guarantees that we can have of the maintenance of our necessary foreign food supply.

Danger of Selling Country's Seed Supply.

I do not desire to go into details as to the amounts of the different classes of foodstuffs and the prospect that lies before us. I desire only to deal with the broad principles that underlie this resolution. There is undoubtedly a great temptation to the average farmer, tempted by the offer of a fancy price for his oats, to say: "I will sell my whole crop and take my chance of finding my seed somewhere; the war may be over and prices may be lower when next seed time comes round." I do not think that any greater disaster could befall the country than that the farmers should part with an ample margin till seed time next year. I look upon that as one of the worst calamities that could possibly happen this country, because you have to bear in mind that there is no other country under present circumstances that could replace this seed. There is no other country which could supply this country with seed oats and wheat of the proper quality, even if the war should happily be over when seed time next comes round. I am able to endorse what has been said of our present harvest prospects. You who live in the south and west are fortunate owing to the fact that your climate enables you to reap your harvest long before ours is ready for the reaping; but we are grateful to an over-ruling Providence which seems to promise us not only a bountiful harvest, but one of the earliest harvests that we have had for many years.

We hope that with the fine weather conditions prevailing, we may be allowed time for its ingathering ; and if this is done with the energy which we hope will be stimulated by the resolution which I have now the honour to second, I think the result will be that no one, man, woman, or child, in this country, will have the appalling fear of starvation before them during the next twelve months.

Question of Transport Facilities and Freights.

My last word on this subject is that I think there are some things outside the strict limits of the resolution in which the Department could help the country during the next few months. I observe, sir, that there has been too great a readiness to lessen our transport facilities to the other side of the Channel. We know that there has been special need in certain directions for the withdrawal of some of our accustomed steamers ; but we do not think, even admitting that special need, that there has been quite justification for the absolute ignoring of the needs of this country in regard to the transporting of food to the other side of the Channel. I hope that the Department will keep a watchful eye on this matter, and that, as we hope, in the early future we shall have a full service of steamers available. You might also carry the inquiry a little further, and see to it that no attempt is made to raise freights still more than they have been raised during the last year or two. I may mention that my thoughts are led in that direction by a notice which I saw in my office yesterday, which intimates that a certain combination of steamship lines trading to the Mediterranean are now preparing, according to the printed notice, a system of sailings more elaborate, but subject to an increased freight of no less than 50 per cent., while the Government is prepared to insure the war risks for 3 per cent. That is a matter in which I think our Department can help ; but it is rather outside the scope of the resolution, and, therefore, it is perhaps irregular for me to refer to it. It is, however, part of the problem raised by the war.

I am happy to find to-day this representative gathering of our Council at one in doing all we can throughout the four provinces of Ireland to lessen the hardship of a war for which we have no responsibility, but which, having embarked upon, we intend to carry through on civilised lines with the minimum of hardship and suffering to any man, woman, or child in these islands.

WINTERING STORE CATTLE.

EXPERIMENT AT ATHENRY AGRICULTURAL STATION.

The feeding of cattle to be sold as stores may be divided into three stages, (*a*) the period of the rearing of the calf; (*b*) the summer period; and (*c*) the winter period. Some years ago the Department carried out a number of experiments relating to calf-rearing, and published the results in special leaflets dealing with this phase of the industry. The summer stage presents no difficulty as it is the almost universal custom in this country to pasture store cattle in summer and to give no other feeding. The question as to the most economical method of wintering store cattle is one, however, on which there is considerable diversity of opinion.

With a view to comparing the results obtainable from different systems of wintering stores, the Department recently conducted an experiment at their Agricultural Station at Athenry, in the West of Ireland. This experiment was started in the winter of 1910-11, and repeated in each of the three following years. Although the character of the weather varied in the four winters during which the test was carried out, the other conditions were similar and the results were remarkably uniform from year to year. In order, therefore, to present the facts in as concise a manner as possible the results for the four seasons have been combined, and in this report they are dealt with as if the experiment had been completed in one season.

The total number of animals comprised in the test was 108, and they consisted of 48 Aberdeen Angus cross-bred bullocks, 30 Aberdeen Angus cross-bred heifers, and 30 Shorthorn cross-bred bullocks. In each year only animals of the same breed and sex were included in the experiment. Thus in the first year there were 10 Shorthorn bullocks in each lot, in the second year 10 Aberdeen Angus cross-bred heifers in each lot, and in the third and fourth years 8 Aberdeen Angus cross-bred bullocks in each lot. Thus, in any one year, any error that might arise from differences in breed or sex was eliminated, while the use of different breeds in successive years widened the scope of the experiment. The average age of the animals at the beginning of the test was about 21 months. The experiment commenced about the end of November in each year, and was continued until about the end of April. The dates varied slightly according to the condition of the pasture at the beginning and end of each winter period.

The feeding and treatment of each of the three lots were as under :—

Lot I.—Housed all winter and fed with roots, cake and straw.

Lot II.—Out-wintered and fed with hay and cake.

Lot III.—Out-wintered and fed with hay only.

Lot I. were kept inside all the time (night and day) in a well-ventilated shed with a "Cundy" roof. During the first winter these in-fed cattle were given a ration consisting of :—

4 stones roots,

3 lbs. cake and meal,

Oaten straw *ad lib.*

The cake and meal mixture was composed of :—1 part decorticated cotton cake, 1 part soya cake, 2 parts dried grains.

During the three following years, 1911-14, the dried grains were omitted from the mixture, and 2 lbs. per head of soya and decorticated cotton cake in equal proportions were given. A smaller quantity of roots was fed for the first few days after the cattle were housed, and at the end of the first and third seasons hay replaced the oaten straw on account of the latter running short.

Lot II. were not housed. They were given hay on the grass and for the latter part of the winter period from about January to the end of March, an allowance of 2 lbs. per head per day of the same concentrated foods as fed to lot I.

Lot III. were also out-wintered, and they were given the same quantity of hay as lot II. but no cake.

The pasturage of lots II. and III. was interchanged every fortnight, with the object of eliminating any effect that might have arisen from difference in the quality as well as quantity of the herbage or location of the fields ; consequently, these two lots were treated exactly alike except that one received an allowance of cake along with the hay, while the other received hay only.

The following table shows the total quantities of food consumed and the cost thereof at the prices specified :—

Quantity and Cost of Food.

Lot	Quantity of food Consumed	T.	C.	Q.	LB.	Price charged for food	Total Cost
I.		T.	C.	Q.	LB.		£ s. d.
	Roots . . .	128	0	0	0	8s. per ton	51 4 0
	Straw . .	36	9	0	0	30s. „	54 13 6
	Hay . . .	3	4	2	0	40s. „	6 9 0
	Cake and Meal .	5	11	2	20	8s. per cwt.	44 13 5
							£156 19 11
						Cost per head	£4 7 3
II.		T.	C.	Q.	LB.		
	Hay . . .	22	19	3	0	40s. per ton	45 19 6
	Cake and Meal .	3	12	0	0	8s. per cwt.	28 16 0
	Pasturage					20s. per head	36 0 0
							£110 15 6
						Cost per head	£3 1 6
III.		T.	C.	Q.	LB.		£ s. d.
	Hay . . .	22	19	3	0	40s. per ton	45 19 6
	Pasturage					20s. per head	36 0 0
							£81 19 6
						Cost per head	£2 5 6

In the above calculations cake and meal are charged at cost price and the manurial value of these foods is not taken into account; the extra manure made by the inside lot is set against litter and extra cost of attendance.

The bulky farm produce (hay, straw and roots) have been charged, not at their selling value, but at what may be considered a fair price for these articles when consumed on the farm, and, moreover, at a price that should leave a fair profit where good average crops are grown. When bulky farm produce is fed to store or fattening cattle the profit is generally obtained indirectly from their consumption of produce which, in many cases, could not be profitably marketed and from the manure which is subsequently obtained.

The value put upon winter pasturage, namely £1 per head, may be considered too high for some districts and too low for others. This charge must vary considerably in different districts, according to the quality of the land, the quantity of grass or foggage left on the fields at the beginning of winter, local conditions, etc. When the experiment started each year the fields were fairly well eaten down, and were what would be considered in some districts on the bare side; so that the charge for pasturage, which is more or less hypothetical, is, if anything, rather high. On the other hand, the damage done to the pasture by treading, and continually

eating down the fresh growth in spring, and thereby preventing it from making a good start, has to be taken into account.

The subjoined table shows the winter increases in live weight made by the different lots.

LIVE WEIGHT INCREASE DURING WINTER PERIOD.

LOT	No. of Cattle	No. of days fed	Average weight at start	Average weight when inside Lot were turned out	INCREASE
			C. Q. LB.	C. Q. LB.	C. Q. LB.
I.	36	150	7 1 7	8 2 16	1 1 9
II.	36	150	7 1 7	8 0 1	0 2 22
III.	36	150	7 1 7	7 2 25	0 1 18

After each season's experiment was brought to a close it was deemed advisable to graze the cattle together under similar conditions, with the object of ascertaining whether the winter feeding had any effect on their subsequent growth. In the second year, five of the in-fed heifers were considered in too forward condition at the end of April to be turned out to graze, and, after five weeks indoor feeding, they were sold fat at the beginning of June. With this exception the three lots were grazed together and treated exactly alike each year till the month of July, an average period of twelve weeks, when it was considered that the effect (if any) of the winter's feeding had ceased to operate.

The progress made by each lot during this period is shown in the following table :—

AVERAGE INCREASE MADE BY EACH LOT DURING THE SUMMER PERIOD OF TWELVE WEEKS.

LOT	No. of Cattle	Average weight when put together to graze	Average weight after 12 weeks on grass	INCREASE
		C. Q. LB.	C. Q. LB.	C. Q. LB.
I. . .	31	*8 1 25	9 1 6	0 3 9
II. . .	36	8 0 1	9 2 14	1 2 13
III. . .	36	7 2 25	9 1 24	1 2 27

* The average weight at the end of the winter period in the last table of 8 cwt. 2 qrs. 16 lb. is for 36 cattle. This figure is for 31 only.

Taking the two periods together (summer and winter) the average increase made by each lot was as follows :—

	Winter Increase	Summer Increase*	Total Increase
	C. Q. LB.	C. Q. LB.	C. Q. LB.
Lot I. . .	1 1 9 (Cost per Head, £4 7*s.* 3*d.*)	0 3 9	2 0 18
Lot II. . .	0 2 22 (Cost per Head, £3 1*s.* 6*d.*)	1 2 13	2 1 7
Lot III. . .	0 1 18 (Cost per Head, £2 5*s.* 6*d.*)	1 2 27	2 0 17

* No figures are given for the cost of summer feeding, as this may be regarded as the same for all three lots.

A comparison at the end of the winter period between the inside and the two outside lots shows that the inside lot made 2 qrs. 15 lb. more increase than lot II. which were fed outside and received cake along with the hay; and that this increase was produced at a cost of £1 5*s.* 9*d.*, or 40*s.* 7*d.* per cwt. The increase over the lot that received hay only was 3 qrs. 19 lb., produced at a cost of £2 1*s.* 9*d.*, or 45*s.* 5*d.* per cwt. If weight only is taken into account, the extra increase made by the inside lot over lot II. would hardly pay for the extra food consumed and the increase made by the inside lot over lot III. would not pay for it.

Over and above the weight, however, the general appearance of the cattle has to be considered. Where first-rate fattening land is available and cattle that have been in-wintered could be gradually accustomed to the change, they might probably be made into grass beef sooner, and thereby command a better market. On the other hand, if they have to be sold in the open market, their stall-fed appearance would in all probability tell against them, and they would very likely realise less per cwt. than the cattle that had been fed outside.

When the animals were weighed in July, twelve weeks after they were turned out to graze, it was invariably found that the out-wintered cattle had increased much more rapidly in weight than those that had been fed inside during winter. This was the case each year, no matter what the climatic and other conditions were. Reference to the previous table will show that the combined winter and summer increases of lot I. were practically the same as lot III. and 17 lb. less than lot II. In this and in all other experiments carried out by the Department at their Agricultural Stations, where cattle were housed night and day during winter, the animals lost weight during the first two or three weeks after being put on the grass.

Whether or not it may be profitable to feed inside during winter cattle that are to be fattened during the following summer on first-rate feeding land this experiment clearly shows that, under conditions such as prevail at Athenry, greater profit can be obtained from out-wintering if the animals are kept over as stores. Moreover it indicates that, for summer grazing as stores in-wintered cattle are worth less per cwt. at the beginning of May than out-wintered animals, and justifies the action of farmers who have to purchase their store cattle in spring in "fighting shy" of cattle that have the appearance of having been in-fed.

If cattle were housed at night only and turned out for a run during the day they would not, in all probability, undergo any material reduction in weight when changed to their summer quarter, or at any rate only to a slight extent compared with those wintered entirely inside.

Outside the question of whether it is more economical to winter stores inside or out, there is another aspect that has to be considered in the case of light tillage lands, namely, the making of manure. On such lands, situated in districts where it is not possible to purchase horse or cow manure it is an absolute necessity to make manure to keep the land in good physical condition.

A comparison of the results obtained with the two outside lots shows that the average cost of the cake and meal fed to lot II. was 16*s*. per head, the difference between £2 5*s*. 6*d*. and £3 1*s*. 6*d*. according to the previous table, and the extra increase in weight at the end of the winter period over lot III. was 1 qr. 4 lb. If weight only is considered, this increase would be worth about 10*s*., which would leave a loss of about 6*s*. per head. However, had the cattle been sold about the end of April, the extra condition and thriftier appearance of the animals would probably have enabled them to realise at least 1*s*. per cwt. extra. With a beast weighing 8 cwt. this would more than make up the loss stated above. Moreover, on farms where cattle are sold fat off the grass, it would very likely pay to cake feed them during the winter, and not only so, but to continue the cake until there was a full bite of grass or possibly until the cattle were finished. By so doing, the cattle could be got off sooner, and might command a better market. On the other hand, where cattle have to be grazed as stores, the results of the experiment show that it does not pay to cake feed out-wintered cattle where there is a plentiful supply of good hay. By the month of July the difference in the weights of the two out-wintered lots was only 18 lb. per head in favour of the cake-fed lot, and at this date there was no appreciable difference between them so far as condition and general appearance were concerned.

THE ARTIFICIAL PRODUCTION OF VIGOROUS TREES.

By AUGUSTINE HENRY, M.A., F.L.S., *Professor of Forestry, Royal College of Science, Dublin.*

I.—SPECIES, SPORTS, AND HYBRIDS.

During the past four years I have been making experiments in the production of new trees by hybridisation, in the hope of obtaining fast-growing kinds that would produce timber rapidly. My main object, which was to show that novel and valuable trees could be artificially made, is now achieved; and there is a possibility of similar work on commercial lines being undertaken by enterprising firms. Before giving an account of my researches, which will be practically useful, some explanation is desirable of the nature of the trees around us in the wild state and in cultivation. This involves a consideration of what is meant by species, variety, race, sport and hybrid.

Species.

The term "species" is hard to define. Darwin never attempted to do so; but assumed that a species was a collection of numerous individuals, all differing slightly and tending to vary in the course of time, the ultimate result being new species. What one may call natural species,* in the case of trees, are readily recognised by the occurrence of each in a definite region or habitat. We have thus one species of silver fir in Central Europe, another in Algeria, a third in Southern Spain, etc. Of our common trees—oak, birch (see Fig. 1), and elm—there are pairs of species† in the same region, each, however, occupying a different habitat, one species adapted to a dry situation, the other suited to a moister soil. The pedunculate oak is a native of valleys and alluvial flats, as on the banks of the Nore at Abbeyleix. It is not protected against evaporation of water, the supply of which in the ground it prefers being always ample. The sessile oak is a native of hilly and rocky districts, where water is not abundant in the soil. Its leaves are covered beneath with hairs, which guard against excessive loss of water by transpiration in windy weather. The native oak of the Wicklow mountains, as at Shillelagh, is this species. Similarly two alders exist on the Continent, but only one species, *Alnus glutinosa*, reached our islands, after the retreat of the Ice Sheet and before the land connexion with France was severed by the formation of the Straits of Dover. The other species, *Alnus incana*, grey alder, is absent from our native flora; but when intro-

* See Bateson, *Problems of Genetics*, 185 (1913). Some naturalists believe that a species is a collection of immutable pure lines or micro-species, which, if kept isolated, would never vary, but which by crossing produce new forms.

† The number of species increases in warm climates. In the Mediterranean region, in addition to our two oaks, there are other deciduous species as *Quercus Cerris* and *Q. conferta*, and several evergreen oaks, as *Q. Ilex*, *Q. Suber*, etc.

Fig. 1. The two native species of birch and of oak.

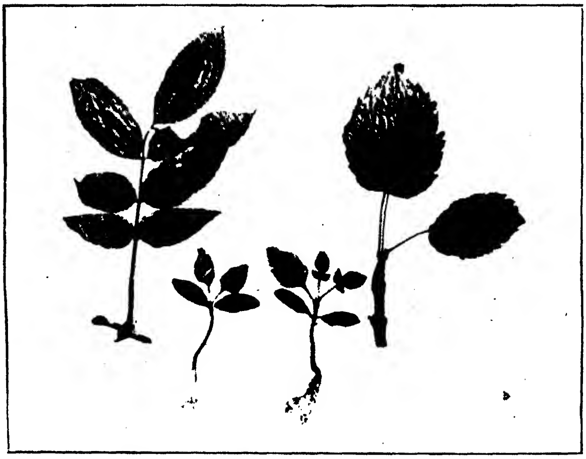


Fig. 2.– Adult foliage of common ash on left, of simple-leaf ash on right ; two ash seedlings in the middle, showing primary leaves above the pair of cotyledons.

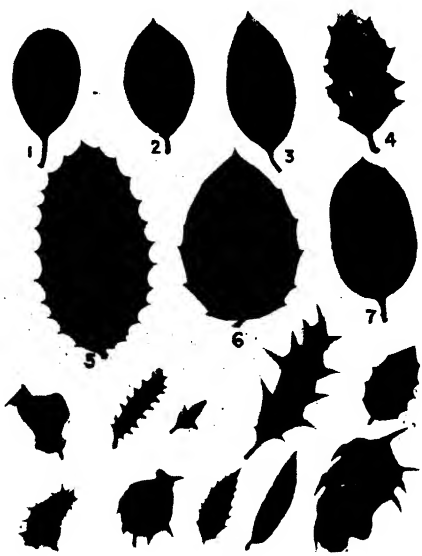


Fig. 3. Holly. Species :—1. Ilex Perado ; 2. I. balearica ; 3, 4. I. Aquifolium (native). Hybrids :– 5. I. Wilsoni ; 6. I. Hodginsi ; 7. I. Hendersoni. Sports :—The leaves not numbered are those of different sports of the native holly.

duced is very hardy and is useful for planting in low-lying situations liable to spring frosts. The ash requires such special conditions of soil, that only one species exists in Northern and Central Europe, there being no suitable soil for a second species to inhabit.

A natural species is often a set of individuals uniform over a large area; but it may consist of two or more "geographical varieties," which correspond with distinct territories, each marked by slight differences of foliage, etc., that render the variety better fitted for its own habitat. Thus the Corsican and Austrian pines are closely related, but the latter keeps its leaves two years longer on the branches, so that the dense shade of its abundant foliage preserves moisture in the crevices of the hot limestone rocks, on which it grows in its Austrian and Servian home. The Corsican pine, with half the foliage of the other tree, thrives on granite soil in the moist insular climate of the mountains of Corsica. These two pines—only notably distinct in one character, the amount of their foliage—are usually regarded as two geographical varieties of the same species, *Pinus Laricio*; but by some botanists are considered to be two distinct species.

In a species apparently uniform over a large area, there may exist varieties, characterised by minute and scarcely describable differences. This is exemplified by the Scots pine. Plots of its seedlings, raised from seed of trees in the forests of Scotland, Russia, Switzerland, etc., differ in vigour and in other respects (immunity to certain fungi, etc.), when all are grown together under identical conditions. Such varieties, with slight differences of structure, may be called races, and are of great practical importance in forestry. Only seeds of the best race, that is, from vigorous trees of the most suitable locality, should be used.

Sports.

A sport is usually a solitary phenomenon, arising either as a sporadic peculiar seedling from a seed, or developing out of a bud on a tree as a single branch with some peculiarity of twig or leaf. A sport may be looked upon as a freak, not forming the starting-point of a new species, but speedily becoming extinct if left to nature. Sports, when of interest on account of the curiosity or the beauty of their appearance, are propagated usually by grafts, cuttings, or layers; being only in rare cases perpetuated by seed. Some sports are due to arrested development. The tree, in the course of its life, often passes through stages, like those of an insect. The seedling of many species differs from the adult tree as a larva from a butterfly. The infant ash has simple leaves. The sport known as the simple-leaf ash is simply a seedling ash, which has never progressed to maturity and may be called a persistent larval form (see Fig. 2). The Irish yew was found in 1767 as a seedling on the mountain behind

Florence Court in Fermanagh, and is characterised by all the branches being directed vertically upwards and all the leaves spreading radially around the twig. This is apparently also the seedling stage preserved. All the myriads of Irish yews, now scattered throughout the world, are cuttings either from the original tree at Florence Court or from trees that were derived from those cuttings.

Lombardy Poplar and Irish Yew.

This upright, so-called fastigiate form may occur as a sport in any species, the best known being the Lombardy poplar, which originated on the banks of the Po about 1700, and subsequently spread over the world. The Lombardy poplar and Irish yew are striking examples of the immense number of individual trees of a sport that may exist, this abundance being entirely due to human agency. Left to nature, these two remarkable forms would never have multiplied, and would have ceased to exist, once the original trees had succumbed to old age or injury. The fastigiate sport is of rare occurrence in most genera, usually only a single original tree being recorded. Amongst, however, the cypress and juniper families, fastigiate seedlings are common; and the upright habit appears to come true from seed. The Mediterranean cypress has been known in this peculiar narrow form for centuries, but always cultivated. In the wild state, as in the mountains of Cyprus, the tree is widespreading in habit. The common juniper, however, is often fastigiate in the wild forests of Scandinavia. This exemplifies the difficulty of strict definition in nature, as the fastigiate habit, which is a rare sport in most trees, becomes in the junipers and cypresses almost a normal form, capable of being perpetuated by seed.

Weeping trees, in which the branches hang vertically downwards, are occasionally the normal form of the species, as in the Himalayan spruce (*Picea Smithiana*) and the Siskiyou spruce (*Picea Breweriana*). In the common spruce (*Picea excelsa*), the weeping form is rare, and may be looked upon as a sport.

Abnormal colouring of leaves, so-called variegation, is a sport, usually* starting as a solitary branch on an otherwise normal tree, which, when noticed, is propagated by grafting. Deeply-lobed, crumpled, pitcher-like and other abnormal leaves occur in many species, and are propagated as curiosities. In sports, reversion is often seen; thus on a fern-leaf beech one or two branches with normal leaves are not uncommon. This reversion may be due to the influence of the stock, as these sports are usually grafted; or it may be explained as the triumph locally of normal over abnormal

* In a bed of alder seedlings at Glasnevin there are two dwarf plants with yellowish foliage. There are also several plants prostrate in habit and without a definite leader. These might be propagated, giving rise to new and peculiar alders.

factors. Such reversions are never seen in hybrid trees. The occurrence of a sport seems to predispose to further sporting; a tree with leaves abnormal in shape will sometimes take on, in one branch, abnormal colour as well. These double sports are common in the holly.

Sports are scarcely of any economic importance in forest trees; but may be of great value for other purposes, as in the case of seedless fruits.

Hybrids.

Hybrids are combinations of two species or of two varieties, which arise either in the wild state or in cultivation. They are met with in nature as rare individuals on the boundary line between the areas occupied by two species. This is well seen in Yorkshire, where a hybrid oak* is found in the localities in which the sessile oak of the hills comes in contact with the pedunculate oak of the valleys. Hybrids arise frequently in nurseries, gardens, and parks, where several species are cultivated together; or they may be due in other ways to man's interference with nature, as in the well-known case of the hybrid Senecio† at Dalkey.

Hybrid trees are more common than has been supposed. Many valuable trees, the real history of which has not been suspected by botanists, are of hybrid origin. As an example, I mention the fine elm, which is universally planted in Holland and Belgium, where it is known as *orme gras* or *Ulmus latifolia*, Poederlé. This is not, as sometimes imagined, a natural species peculiar to those countries. It is unquestionably a hybrid,‡ which is invariably propagated by layers, all the individual trees on this account being uniform in appearance. It seems to have originated three or four centuries ago, probably as a single seedling, which has given rise by vegetative reproduction since to millions of descendants.

The distinction between sports and hybrids is well known in the numerous so-called "varieties" of the holly (see Fig. 3). Some are sports of *Ilex Aquifolium*, our native holly; others are hybrids, one parent being the common holly, whilst the other is either *Ilex Perado*, which was introduced from Madeira in 1760, or *Ilex balearica*, the holly of the Balearic Isles, which was cultivated at Versailles in 1789. Miller, in his account of the hollies in 1750, was acquainted

* The occurrence of this hybrid in England was first pointed out in *Trees of Great Britain and Ireland*, ii. 288 (1907), the specimens referred to having been sent to me by Mr. G. Ross of Hexham.

† Sir F. Brady, in 1875, introduced into his garden at Dalkey a plant with white leaves, *Senecio Cineraria*, which soon spread over the rocks along the coast. On the adjoining grassy slopes the ragwort, *S. Jacobaea*, with green leaves is common. A hybrid of these two species has arisen, plainly intermediate in its greyish leaves, but taller and lankier in growth than either parent.

‡ Proved to be a hybrid by the nature of its seedlings. See *Trees of Great Britain*, vii. 1870 (1913). The oldest examples living, which are in Brussels Park, were planted in 1760. Fine avenues occur on the main roads near Namur.

only with the sports, which had arisen from the common holly, as the other species had not been introduced at that time and hybridisation was impossible. The hybrids originated soon after 1800, the earliest apparently being *Ilex Hodginsi* and *Ilex Hendersoni,* which were found by Hodgins as seedlings in his nursery at Dunganstown, Wicklow. Here *Ilex Perado* was cultivated ; and old specimens producing flowers and fruit freely are still common in Wicklow gardens. The holly hybrids are vigorous trees, bearing large leaves intermediate between the parent species. The sports of the common holly are always grafted, and are feeble in growth with a tendency for single branches to revert occasionally to the normal form.

The real nature of the numerous elms, poplars, hollies, and other groups in cultivation, can only be elucidated by referring each kind to its proper place as a species, variety, sport, or hybrid.

The results of the experimental sowings of the seeds of numerous elms which I made in 1909, together with an investigation into the history of the Lucombe oak, given in a paper read by me at the Linnean Society on 7th April, 1910, threw new light on many hybrid trees in cultivation, which had not previously been recognised as such, in spite of the fact that no one could find these trees anywhere in the wild state. The statement often made that a particular tree was a "variety of garden origin" was no explanation. The Lucombe oak was observed in the Exeter Nursery in 1765 as a seedling, which differed from its parent, a Turkey oak (*Quercus Cerris*) in being much more fast in growth, and in retaining its leaves* during winter till March. Lucombe propagated this seedling by grafting, and believed it to be simply a sport of the Turkey oak. In 1792 it bore acorns from which numerous seedlings were raised, no two of which were alike, while some strongly resembled in bark and leaves the Cork oak (*Q. Suber*). Lucombe's son then correctly surmised that it was a hybrid—the flower on the Turkey oak, from which the acorn producing it was formed, having been fertilised by the pollen of an adjoining large Cork oak.

This case illustrates several well-known laws in regard to hybrids :

1. The first-cross is usually of exceptional vigour, more vigorous than either parent.
2. When the first-cross reproduces itself by seed, the second generation consists of classes of individuals, which differ from one another and from their parent. The first-cross never comes true from seed, but produces a mixed and varied offspring.
3. None of the individuals of the second generation equal in vigour the first-cross. This was also clearly established in the case of the Lucombe oak.

* The leaves also differed in other ways, not noticed at the time by Lucombe. Their pale colour beneath and sharp points on the margin are derived from *Quercus Suber.*

Other common trees, of which no history is recorded, doubtless originated in the same way as the Lucombe oak, namely, as chance seedlings (the result of accidental crossing by wind or an insect), which observant nurserymen or gardeners found desirable to propagate on account of their vigour.

Valuable Hybrid Trees.

The introduction in quantity into Europe during the seventeenth century of North American trees, which grew alongside similar but distinct European species in parks and gardens, was the occasion of considerable hybridisation. Trees like the black Italian poplar* and the London plane,† which have nowhere been seen wild, are intermediate in botanical characters between an American and a European species in each case, and are undoubtedly first-crosses. These two trees have been traced back to 1700, about which date the American parents had been long enough in Europe to bear flowers.

Other trees, presumably first-crosses on account of their vigour, botanical characters, and non-occurrence on the wild state, are:— the common lime (*Tilia vulgaris*), Huntingdon elm, and cricket-bat willow, the parents in their cases being allied European species. I have given the history of these trees elsewhere ; but I may mention some instances of the astonishing vigour of these hybrids. The cricket-bat willow ‡ often attains in fourteen or fifteen years from the planting of the sets, 50 to 60 feet in height and 3½ to 4 feet in girth, a size suitable for cleaving into bats. One at Boreham, Essex, felled at fifty-five years old, was 101 feet in height and 18 feet in girth. The wonderful hybrid poplar at Metz, § known as *Populus Eugenei*, measured in 1913, when eighty-one years old from seed, 150 feet in height and 25 feet in girth at five feet above the ground, and seems to be still growing rapidly. A younger tree, a cutting from the original specimen, planted in 1870, was 140 feet high and 16 feet in girth, containing about 700 cubic feet of timber, which must be a record for a tree of any species, only forty-three years old, in temperate

* *Populus serotina*, Hartig. The parents are the American *P. deltoidea* and the European *P. nigra*. The hybrid is much more rapid in growth than either parent, and has entirely replaced the European species in cultivation in this country, France, Belgium, etc. The 'Norway poplar,' now being planted on a large scale in the northern United States, is either this poplar or a hybrid of similar origin.

† *Platanus acerifolia*, W. This hybrid, on account of its vigour and its resistance to drought, has become the favourite tree for planting in the cities and towns of Europe. It succeeds equally well as a street tree in New England, its vigour presumably enabling it to escape the attacks of a fungus which renders the native American species, *Platanus occidentalis*, useless for planting in towns in the U.S.

‡ *Salix coerulea*, Smith. The parents are *S. fragilis* and *S. alba*. Its rapid growth produces wood astonishingly light in weight and elastic, the only kind suitable for making cricket-bats of the first quality. See *Trees of Great Britain*, pp. 1763-1768 (1913), an abstract of which, compiled by A. P. Long, was published in *Journal of the Board of Agriculture*, xxi. p. 289 (July, 1914).

§ We are much indebted to M. Jouin, the present owner of the nursery of Simon-Louis at Plantières, near Metz, visited by Mr. A. C. Forbes and me in July, 1913, for the history of these trees. An account of the black poplars was given by me in *Gardeners' Chronicle*, July, 1914, pp. 4, 46, and 64.

regions. Another hybrid poplar at Metz, *Populus robusta*, which was picked up as a chance seedling in 1895, appears to be quite as vigorous. A fine example of this, growing in poor shallow soil in the Glasnevin Botanic Garden, was obtained as a rooted cutting in 1899, and now, after fifteen years' growth, is about 45 feet high, girthing 2 feet 3 inches. It looks an ideal tree for the rapid production of cheap timber for box-making, etc.; but it remains to be seen whether it will succeed in Ireland in wind-swept situations.

The striking feature of first-crosses, it is evident, is the difference* in the rate of growth from that of the parents. These hybrids of the first generation, in trees as in other plants, are remarkable for their size, rapid growth, early and free flowering, longer period of life, the ease with which they can be multiplied, and in all probability their comparative immunity from disease. Impressed with these facts, I urged,† in 1910, that the artificial production of trees by crossing was a new and important field of research. Before giving an account of the work since carried out, I must record my grateful thanks to the Directors of the Royal Botanic Gardens at Kew and Glasnevin for much assistance rendered. I also owe much to the Curator of the Botanic Garden at Cambridge, who afforded me many facilities.

II.—Artificial Hybridisation of Trees.

History of Hybridisation.

The first person, on record, to raise artificially a hybrid plant was Fairchild, who fertilized, in 1715, the stigma of a Carnation with the pollen of a Sweet William, producing a new and beautiful flowering plant. Since his day innumerable hybrids have been raised by gardeners and scientific experts, with the object of obtaining novel and valuable kinds of flowers, fruits, cereals,‡ etc.; but it is remarkable how little has this method been applied to the improvement of forest trees.

In 1845 Klotzsch§ started work in this direction at Berlin. He crossed four pairs of species, all common trees—*Pinus sylvestris* and *P. austriaca*, *Quercus pedunculata* and *Q. sessiliflora*, *Alnus glutinosa* and *A. incana*, *Ulmus nitens* and *U. pedunculata*. The crossed seeds and those of the parents were sown together in the

* In certain herbaceous plants and shrubs, first-crosses display less energy of growth than either parent. Similar exceptional cases may be expected in trees.

† *Journ. Linn. Soc.* (*Bot.*), xxxix., 290-300 (1910). A German translation of this appeared in *Mitt. Deut. Dend. Ges.*, 1910, pp. 75-81.

‡ East, *Heredity and Eugenics*, 116, fig. 49 (1911), gives an instance of the vigour produced by crossing two kinds of maize, one yielding 47 bushels and the other 16 bushels per acre. The first-cross yielded 117 bushels, whilst its seedlings (the second generation) gave 91 bushels.

§ See *Monatsbericht K. Preuss. Akad. Wiss. Berlin*, 1854, pp. 552-562, abstracted in *Bull. Soc. Bot. France*, ii. 327 (1855).

same soil, and after eight years the hybrids averaged one-third taller than the parent species. Klotzsch claimed that by hybridisation, both the rapidity of growth and the durability of timber of forest trees could be augmented considerably; but no further experiments were made, and his pioneer work fell into oblivion.

The art of breeding trees was renewed, when Burbank began to cross the different walnuts in California. De Vries,* whose account I rely upon, states that Burbank produced, in 1891, the Paradox walnut, a hybrid between *Juglans regia* (European walnut) and *J. californica* (native Californian walnut). Three of these trees growing at Santa Rosa in 1906 measured 80 feet in height and 6 feet in girth, an astonishing size for a walnut to attain in fifteen years. Three trees of the same origin cut down in 1904 yielded beautiful timber, with annual rings one inch in width. Another hybrid, the Royal Black walnut, made at Santa Rosa in 1878 by crossing *J. californica* with *J. nigra* (black walnut of the eastern U.S.) is figured by De Vries, who, astonished at its magnitude, says that, next to the Redwood and Wellingtonia, it was the largest tree † and fastest grower that he had ever seen.

Owing to the extensive cultivation of three species of walnut in California, accidental hybrids are not uncommon. One‡ of these, a Paradox walnut, at Yuba City, though less than forty years old, was lately measured by Mr. Peter Bisset,§ of the U.S. Department of Agriculture, as 99½ feet high, with a trunk 15 feet 4 inches in girth at four feet from the ground, and a spread of branches of 108 feet (see Fig. 4). It is remarkable that these wonderful hybrids are not grown for timber, walnut trees being cultivated in California solely for their fruit; but Mr. Roeding explains this by the fact that there is still so much timber available in the forests that "Californians have not reached the point of thinking that it is necessary to plant timber trees."

Prof. E. M. East,|| of Harvard University, informs me that Mr.

* *Plant Breeding*, 174, 175, fig. 55 (1907).

† Mr. G. C. Roeding of the Fancher Creek Nurseries, Fresno, writes to me that this enormous tree still exists, and in his catalogue gives a photograph of a Royal Black walnut 100 feet in height and 9 feet in girth at 16 years old, which seems incredible.

‡ R. E. Smith, in his important publication on "Walnut Culture in California" (*Berkeley Agric. Exper. Station Bulletin*, No. 231, p. 157, 1912), says of this tree: "It is conspicuous long before reaching the town, rearing its enormous head over every other object in the vicinity." He confirms all that is stated above concerning the great vigour of first crosses of walnuts in California.

§ A much larger hybrid walnut growing on Rowe Farm, James River, Virginia, U.S., measures over 100 ft. in height, and 31 ft. in girth at 4 ft. above the ground. It is figured in *Journal of Heredity*, 98, fig. 1 (1914) by Mr. Peter Bisset. who considers it to be *J. cinerea* × *J. regia*. It was supposed by Prof. Sargent to be *J. nigra* × *J. regia*. See Elwes and Henry, *Trees of Great Britain*, ii. 255 (1907).

|| East, in *U.S. Dept. Agric. Bureau of Plant Industry, Bull.* No. 243, p. 48 (1912), unaware of my paper in *Journal of the Linnean Society*, 1910, advocated as a new idea the use of first generation hybrid trees for producing timber. This valuable Bulletin should be studied by all interested in the production of increased crops of cereals, tobacco, etc.

H. K. Hayes, of the Agricultural Station, New Haven, Connecticut, raised crosses between two species of *Catalpa,* which were three years old in October, 1913, and showed great excess in vigour over that of the two parents. I am not aware that anything has been published concerning this interesting cross.

Before giving details of my own experiments, several interesting questions may be dealt with.

Quality of Fast-grown Timber.

It is a popular belief that fast-grown timber is necessarily soft and comparatively worthless. This is a fact in most conifers; but in one class of broad-leaf trees, the wood of which is characterised by large pores in the inner part of the annual ring, the contrary is true, as the faster the timber of these trees is grown the stronger and denser it becomes. This class includes oak, ash, chestnut, hickory, and walnut, the species in fact that *par excellence* produce the most valuable timber.

All the more reason, then, for efforts to produce fast-growing crosses in the case of these precious trees. To quote from the conclusion of my paper of 1910: "In countries like our own the only hope of salvation for forestry is in growing timber rapidly; and we have been helped in that by the introduction of fast-growing conifers like the larch, the Corsican pine, and the Douglas fir. But it is essential to grow the more valuable classes of non-coniferous timber." The difficulty of growing the ordinary species of oak, ash, and walnut is the long period required for their maturity, which renders hopeless, except on the best soils, all chance of an adequate financial return. Without vigorous first-crosses, the most valuable classes of timbers can only be grown in limited quantity.

Immunity from disease might be expected in some if not all first-crosses. In the case of ordinary species, individuals of great vigour are undoubtedly less liable than weaklings to the attacks of fungi and are probably less sought for by insects, like Chermes and Aphis. In this way a vigorous cross between two larches might prove immune to Peziza.

There is also a possibility of obtaining hybrids, capable of thriving on certain classes of soil, as chalk and peat, on which ordinary kinds of trees cannot be profitably grown.

Propagation.

An important question is the propagation of these vigorous crosses, once they are created. The first-cross* does not come true from seed; and it would be a great drawback if we were obliged to wait till the

* This has been pointed out already in the case of the Lucombe oak. In *Journ. Lin. Soc. (Bot.)*, xxxix., 293 (1910), the seedlings of the Huntingdon elm were shown to consist of numerous different classes. The fact that this vigorous hybrid elm does not come true from seed was established at the Oxford Assizes in 1847, when a nurseryman brought an action against Mr. Rivers for supplying seedlings of this elm which were expected to be the same as layered plants, but which turned out very different. See *Gardeners' Chronicle*, 1847, p. 507.

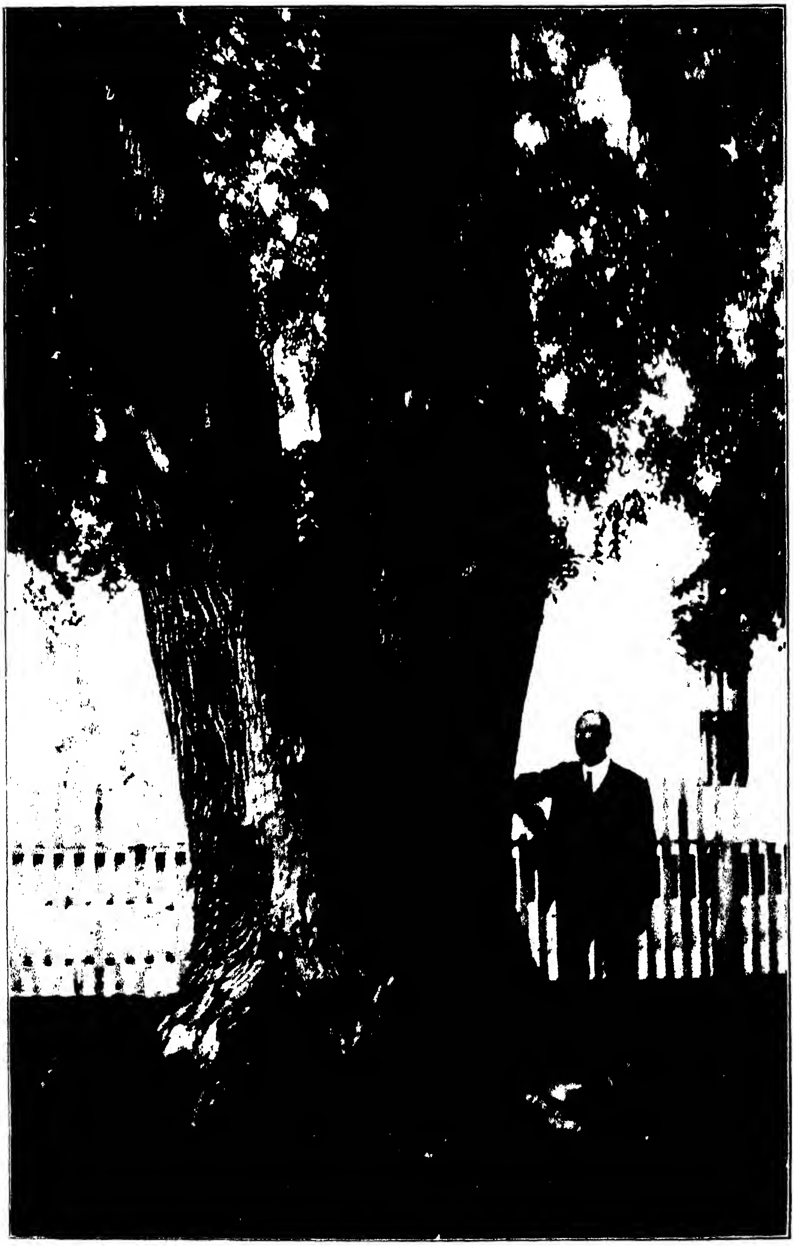


Fig. 4—Hybrid Walnut in California.
Photograph from U.S. Department of Agriculture, Forest Service.

THE ARTIFICIAL PRODUCTION OF VIGOROUS TREES.

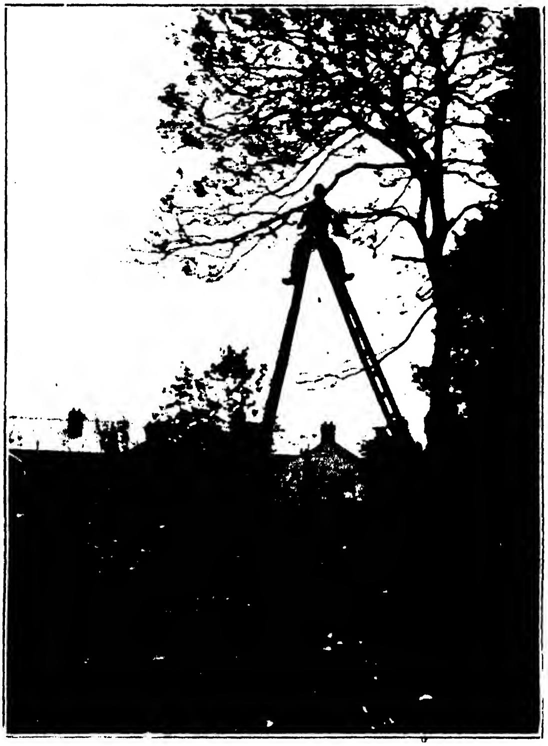


Fig. 5.—Cross-fertilising a walnut tree. The bags are on the branches above and to the left of the operator.

newly-made trees bore flowers and fruit. The first-cross, in short, can only be multiplied by vegetative reproduction. This is easy when the trees are readily propagated by cuttings, as in the case of poplars and willows, or by layers, like the Huntingdon and Belgian elms. We may resort to grafting low on stocks; which should be perhaps seedlings of one or other parent.* This method will serve when cuttings and layers are not available. It is evident that when a valuable hybrid has been produced, it can be propagated and be put on the market, if necessary, without delay.

Cause of Vigour.

No explanation† has yet been offered as to the real cause of the extraordinary vigour displayed by hybrids. This vigour is distributed over the whole plant, and is as conspicuous in the roots as in the stem and leaves. What we actually observe is not only an acceleration of, but also an increase of cell-division in all parts of the plant. The cells divide very quickly, continue to divide, and thus build up a taller stem, a more extensive root-system, etc. Apparently this alteration in the nature of the division of the cells is not associated with any visible change in their structure. Miss Marshall, B.A., of T.C.D., who examined for me many sections of the growing points of hybrid poplars and their parent species, could find, as the result of three months' observations, no tangible differences in the size of the cells or nuclei, in the number of the chromosomes, etc.

It is possible that the stimulus which causes growth (i.e. cell-division) to commence and to continue is some soluble chemical compound or enzyme. The enzyme in the hybrid may be more complex and more effective than the enzymes in the species. Whether the injection of soluble matter obtained from a hybrid into the growing points of one of the parent species, would stimulate the latter to increased cell-division, might be worth trying, if the experiment could be carried out.

Whether the amount of vigour in hybrids is directly associated with the degree of relationship between the individuals which are crossed, is a disputable point; but one of practical interest in the selection of parents for crossing experiments. One of my most vigorous hybrids (*Populus generosa*) is derived from two parents so little related that they are placed in two distinct sections of the genus. A cross between two races of the common alder shows considerable vigour, though the parents are so closely allied that they can only be distinguished by the most trivial characters. The fact, if established, that different races when crossed give vigorous

* In California grafted hybrid walnuts are said to retain the vigour of the original cross; and it is supposed that the scion stimulates the stock to rapid growth.

† The hypotheses of A. B. Bruce, in *Science*, 1910, p. 627, and of East, in *U.S. Bureau of Plant Industry Bulletin*, No. 243, do not touch the real cause of the vigour displayed.

progeny, should be turned to practical account in plantations and forests, where natural regeneration is looked for. The introduction of a few lines of the Riga variety into a plantation of native Scots pine might ultimately, as pollination would be effected by the wind, give seedlings of enhanced vigour.

The difficulties in breeding forest trees in this country are formidable. Ordinary flowering plants, shrubs, cereals, the subjects of crossing experiments, can be handled in a green-house. Delicate manipulations, as the removal of stamens, etc., on tall trees, are perilous, if not impossible. A serious obstacle is our climate, with its late spring frosts, which often damage flowers after they have been pollinated. On the walnut tree (*Juglans regia*), shown in fig. 5, 140 stigmas were dusted on 16th and 17th May, 1914, with pollen of *J. nigra*, which had just arrived from Portugal,* All this labour was wasted, as the little fruits that had formed, containing the promise of new offspring, were killed by the severe frost of 25th May last, and fell blackened to the ground.

There is great difficulty in obtaining pollen of suitable exotic species, especially broad-leaf kinds, as the specimens of these growing even in warm districts of England or Ireland rarely produce good flowers. For several reasons the production of hybrid trees evidently can be undertaken with the best chances of success in southerly stations, where numerous species happen to be cultivated, as in botanic gardens like that of Montpellier or at Washington D.C. If hybridisation is tried on a commercial scale in this country, lofty green-houses and special ladders will be required for the protection and easy handling of the flowers of many species.

Of the hybrid seedlings which have been raised, a few showing especial features of interest will now be described in detail. The most striking success has been amongst the poplars. A Carolina poplar (*Populus angulata*) at Kew was chosen as the female parent in March, 1912, when some of its catkins were dusted with pollen of *Populus trichocarpa*, others with that of *Populus nigra betulifolia*, two male poplars also growing at Kew. From the crossed seed, ripe on 15th June and sown at once, two distinct sets of seedlings were raised, which were tiny plants about 2 inches high by the end of the season (October, 1912). In the following year, the two sets were very different in vigour and appearance.

1. The hybrid, *Populus angulata*♀ × *P. trichocarpa*♂, of which there are four seedlings of amazing vigour, may be conveniently called *Populus generosa*.† Starting as tiny plants, they attained at the end

* None of the pollen sent from the United States, the home of *J. nigra*, arrived in time. I received this and some ash pollen from Señor Mendes d'Almeida, Bussaco, and Dr. Prof. Henriques, Coimbra, whose prompt aid I gratefully acknowledge.

† See *Gardeners' Chronicle*, October 17, 1914, p. 258, for first publication of this name.

Fig. 6. —New hybrid poplar, Populus generosa, Henry, 27 months old from seed.

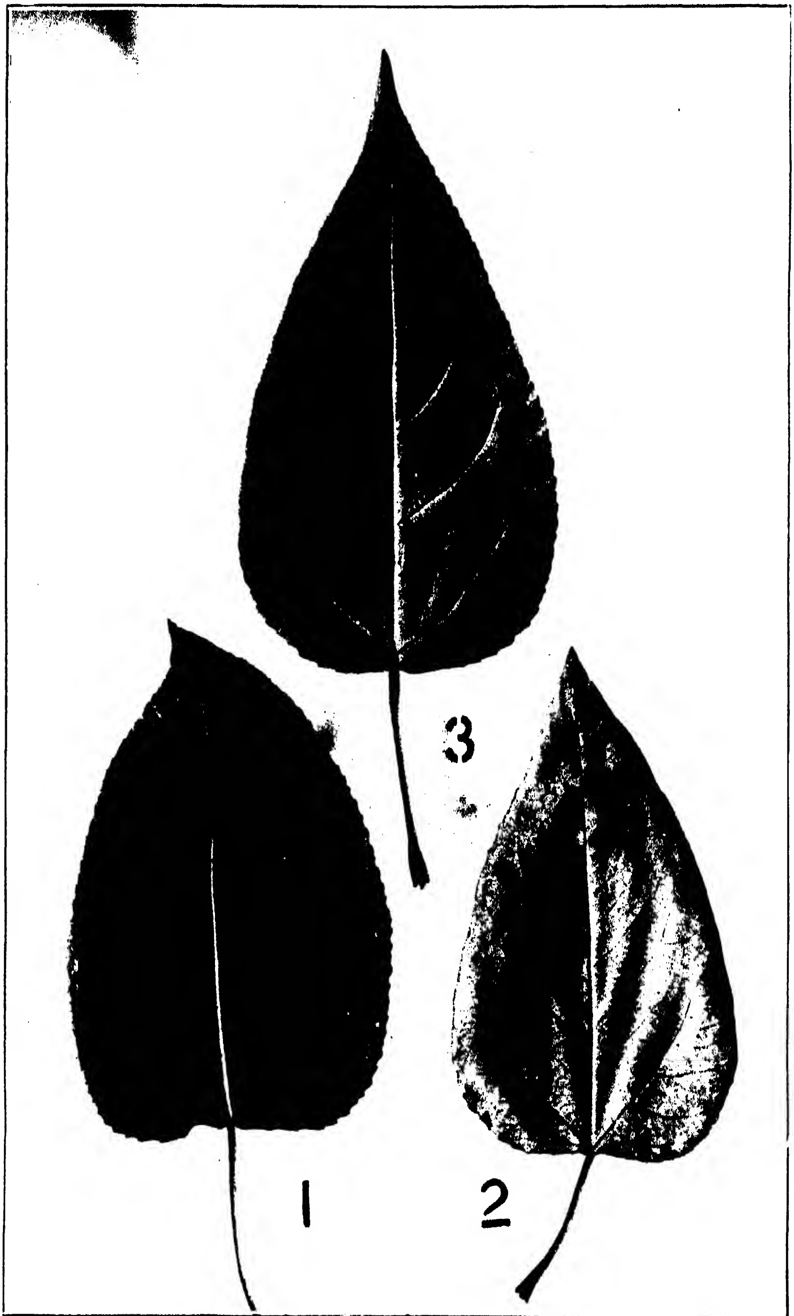


Fig. 7.—New hybrid poplar, Populus generosa, Henry, 3; and its parents, P. angulata, 1, and P. trichocarpa, 2.

of 1913, 3 feet 6 inches, 3 feet 1 inch, 3 feet, and 2 feet 11 inches in height. Two, which were then transplanted, have been checked in growth this year. The two left undisturbed (see Fig. 6) grew astonishingly in 1914—one, which finished growth about the end of July, being now 7½ feet; while the other, which continued to grow till 15th September, is now 10 feet 1 inch high. All four plants are uniform in appearance, bearing large handsome leaves with conspicuous red veins. The parents are so wide apart as to belong to different sections of the genus. *P. angulata* is a black poplar, slow in growth in England, with broad leaves, which are green on both sides, cordate at the base, and girt around the margin with a narrow translucent border; stalks compressed laterally; buds slightly viscid, scarcely odorous. *P. trichocarpa* is a fast-growing balsam poplar, with viscid buds giving off a strong odour; leaves narrow, very white beneath, not cordate, without a translucent border; stalks cylindrical. *Populus generosa* is intermediate between the parents as regards the width and colour of the leaves, which have a pale grey undersurface. It resembles *P. angulata* in the coarse serration of the leaves, which are often cordate at the base and have a translucent border. The almost cylindrical stalk is nearly identical with that of *P. trichocarpa.*

2. *Populus angulata* ♀ × *P. nigra betulifolia* ♂, of which there are seven seedlings, is not nearly so vigorous. Two are strong plants, branching freely, now 4 feet 5 inches and 3 feet 8 inches in height; whilst the others are weak unbranched plants, 2 feet 8 inches, 2 feet, 1 foot 1 inch, 1 foot, and 4 inches. The male parent is the common European black poplar with hairy twigs. The hybrid plants resemble *P. angulata* in having twigs without hairs; but are like *P. nigra* in most of the leaves being cuneate at the base, and prolonged at the tip. In these characters, and in the irregular number of the glands at the base of the leaf, this hybrid is plainly akin to *P. serotina* (black Italian poplar) and *P. regenerata* (Eucalyptus poplar), two hybrids of similar origin, accidentally produced long ago in France, and now the most common poplars in cultivation.

Ash Hybrids.—No tree would be more valuable than a hybrid ash with vigour comparable to that displayed by *Populus generosa.* As the seed of ash lies over for a season, seedlings cannot be raised till two years after crossing of the flowers; and patience is necessary. I have, however, some promising seedlings of two hybrid ashes, obtained from a fine Oregon ash (*Fraxinus oregona*) at Kew, which was pollinated with two other species in 1912. These have just completed their first season's growth; but their merits cannot be rightly gauged till the end of next year. A description of these and other hybrid ashes is given on pp. 47, 48. Effort is being made to hybridise as many species of ash as possible.

Alder Crosses.—Numerous crosses of different species of alder were made at Cambridge in 1911. The seedlings are now three years old and present several features of interest.

1. *Alnus cordata* (Italian alder), used as a mother-tree, and dusted with the pollen of *A. glutinosa*, var. *japonica*, yielded 140 plants identical in all respects with the female parent. No cross-pollination, except in the case of one flower, appears to have been effected, probably owing to the bags being put on too late, so that the tree was self-pollinated. Among the seedlings a solitary "rogue" is conspicuous, being the tallest plant, 5 feet in height, none of the others being more than 4 feet, their average only 3 feet. This "rogue" is plainly *A. cordata* × *A. glutinosa japonica*. It bears leaves like *A. cordata* in general shape and in serrations; but the base is rounded and not cordate, while some scattered hairs (not present in *A. cordata*) are visible on the twig, stalk, and basal margin of the blade. This first-cross, though only a single specimen, is interesting: (*a*) On account of its vigour, as it exceeds all the pure seedlings of the female parent; (*b*) it was uninjured by the frost of 24th May, 1914, which blackened the tips of the shoots of the pure seedlings; (*c*) it differs only very slightly from *Alnus elliptica*, Requien, a natural hybrid between *A. cordata* and *A. glutinosa*, which was found on the banks of the River Salanzara in Corsica, where the two parents grow together in the wild state.

2. *Alnus cordata* ♀ × *A. incana* ♂ (grey alder). Four seedlings—two very vigorous, 5 feet 4 inches and 4 feet 9 inches in height; the others, 3 feet 4 inches and 2 feet 2 inches. They resemble the female parent in the general shape and serrations of the leaf, except that the base is rounded. They are like the grey alder in the pale and pubescent under-surface of the leaf, and in the hairy twigs and petioles. This hybrid is new, being unknown in the wild state, as the parents never grow together.

3. *Alnus incana* ♀ × *A. glutinosa japonica* ♂. Six seedlings, with leaves like the female parent, but differing in the under-surface, which is not pubescent throughout, and not hoary but pale in colour. Twigs and petioles hairy as in *A. incana*. These hybrids are vigorous, 5 feet 6 inches, 4 feet 5 inches, 3 feet 6 inches, 2 feet 9 inches, 2 feet 8 inches, and 2 feet in height. Similar plants found in the wild state have been named *A. hybrida*, A. Braun.

4. *Alnus glutinosa japonica* ♀ × *A. incana* ♂. This is the reverse cross of the preceding, and differs slightly, the twigs being glabrous. The leaves are like *A. incana* in shape, but are pale, not hoary, and less pubescent beneath. The four seedlings obtained are only 2 feet 8 inches, 2 feet 7 inches, 2 feet 2 inches, and 2 feet 1 inch, showing little vigour. Other seedlings, like the mother-plant in all respects, show that the cross failed in most instances, the flowers in some way being self-pollinated.

5. *Alnus glutinosa japonica* ♀ × *A. cordata* ♂. This is the reverse of (1); but cross-pollination was not effected. Five seedlings, 3 feet 10 inches, 3 feet 3 inches, 3 feet, 2 feet 4 inches, and 1 foot 10 inches are exactly like the mother-tree.

6. *Alnus glutinosa europaea* ♀ × *A. cordata* ♂. Cross-pollination not effected. Three seedlings, 3 feet 8 inches, 2 feet 9 inches, and 2 feet 3 inches, exactly like the mother-tree.

7. *Alnus glutinosa japonica* ♀ × *A. glutinosa europaea* ♂. This is an interesting cross between two geographical races,* and seems to be nearly as vigorous as the hybrids between two distinct species. Of the eight seedlings obtained, the two tallest are 4 feet 8 inches and 4 feet 4 inches; whilst the others are 3 feet 6 inches, 3 feet 4 inches, 3 feet 3 inches, 3 feet 1 inch, 2 feet 10 inches, and 2 feet 5 inches. A solitary pure seedling of the female parent raised at the same time is only 1 foot 7 inches.

III.—List of Crosses made 1909-1914.

The following is a list of the crosses that have been tried, failures as well as successes being recorded. In the list, the two species crossed are separated by the sign ×, the female parent being placed first. The measurements of the plants given are the heights, taken to the terminal bud, in September, 1914.

1909.

Fraxinus excelsior, var. *pendula* × *F. angustifolia*. Cross made at Cambridge by W. O. Backhouse in April, 1909. Eleven seedlings raised in 1911, now 40, 39, 35, 24, 22, 21, 20, 19, 18, 15, and 14 inches high; apparently two sets, one hybrid, the other like the mother-tree, possibly due to self-pollination (insecure bags, etc.). No gain of vigour apparent; but two pure seedlings of the female parent are only 13½ and 11 inches.

The pollen of *F. angustifolia*, a native of Spain and Algeria, being shed in January, was kept till 1st April, when the stigmas of the weeping ash are receptive. This may have weakened the seed and the resulting seedlings.†

1911.

1. *Ulmus montana* × *U. americana*. Fruit gathered on 3rd June, sown on 7th June. No seedlings.

* These two races differ very slightly in botanical characters. The Japanese form, judging from the tree at Cambridge, which was raised from seed sent from Tokyo in 1904, has smaller leaves, less distinctly lobed, than the ordinary European alder, while the twigs and petioles are slightly pubescent.

† The variation in the vigour of seedlings is mainly due to the quality of the seed. Thus, 12 seedlings raised from seed of a black poplar (*P. nigra*, var. *betulifolia*) at Enniscorthy, collected by Mr. R. A. Phillips on June 16, 1913, and sown at once, show great difference in vigour. Three are strong plants, now 8, 6, and 5½ in. high; two are healthy, 2½ and 2 in., while eight, barely alive, are less than 1 in. high, with only one or two leaves. These seedlings are pure, the pollen being from an adjoining tree of the same species, and are very small in comparison with hybrid poplar seedlings of the same age.

2. *Ulmus montana* × *U. nitens*. Same dates. Five seedlings; no apparent gain in vigour; doubtful if cross-pollination effected.

Elm crosses are difficult, as the necessary excision of the stamens usually injures the minute flowers.

3. *Larix europaea* × *L. Griffithii*. Seed sown in April, 1912. Two seedlings, now 16 and 20 inches.

4. *Larix europaea* × *L. americana*. Same date. Two seedlings, now 28 and 24 inches.

These four seedlings cannot be distinguished in twigs or leaves from a pure seedling of the mother European larch, which is more vigorous, now 36 inches.

5. *Larix europaea* × *L. dahurica*. No seedlings.

6. *Larix europaea* × *L. leptolepis*. No seedlings.

The preceding crosses were made by Mr. A. P. Long in Devon, selected on account of the mild climate. Hybridisations at distant places were ultimately abandoned on account of the expense, the want of suitable trees, and the reluctance of private owners to allow trees to be covered with bags for two or three weeks.

7–13. Alder crosses made in the Cambridge Botanic Garden. Seed gathered in October, 1911, sown in April, 1912. Numerou seedlings of great interest. See p. 46.

1912.

1. *Fraxinus oregona* × *F. lanceolata*. Pollination on 19th April. Seed collected on 12th September, 1912, and sown on 1st November, 1913. Twelve vigorous seedlings, one being 9 inches, the others averaging 5 and 6 inches in height.

2. *Fraxinus oregona* × *F. americana*. Same dates. Two vigorous seedlings, 6 and 5½ inches.

3. *Fraxinus oregona* × *F. excelsior*. Same dates. Fruit formed, but without seed, and no seedlings raised.

These crosses were made at Kew, where there is an Oregon ash, which bears only female flowers, and serves well as a mother parent. No fruit appeared on this tree in 1912 except on the artificially pollinated twigs, showing that the wind did not carry effective pollen from ash trees of other species in the vicinity.* At Tortworth, where several trees of this species grow together, fruit is regularly borne. The stigmas of *F. oregona* are receptive from about 6th to 30th April, ripening in successive crops.

* It bore, however, in 1914 a great deal of fruit, arising from pollen brought by the wind.

4. *Fraxinus excelsior* × *F. americana.* Pollinated in April, 1912. Seed sown 1st November, 1913. Five seedlings—two vigorous, 6 and 5 inches; three feeble, about 2 inches.

5. *Fraxinus excelsior* × *F. lanceolata.* Same dates. Eight seedlings—three vigorous, about 4 inches; five feeble, about 2 inches.

6, 7. *Fraxinus Ornus,* crossed with pollen of *F. americana* and *F. lanceolata,* set no fruit.

8-14. Various crosses were attempted with maples, the female trees being *Acer pseudoplatanus* and *A. Negundo*; while the pollen used was from *A. Opalus, A. saccharum, A. monspessulanum,* and *A. pseudoplatanus.* As the stamens had to be excised, probably the pistils were injured; at any rate, no fruits were formed.

The crosses (4) to (14) were made at Highnam, near Gloucester.

15. *Populus angulata* × *P. trichocarpa.* Trees at Kew. Pollination early in April; seed collected on 15th June, 1912, and sown at Cambridge on the following day. Four vigorous seedlings. See p. 44.

16. *Populus angulata* × *P. nigra betulifolia.* Same dates. Seven seedlings. See p. 45.

1913.

1. *Fraxinus excelsior,* var. *heterophylla* × *F. angustifolia,* Pollen gathered on 12th January, but seems to have kept well; pollination on 7th April.

2. *Fraxinus excelsior,* var. *heterophylla* × *F. excelsior.* Pollen gathered on 1st April; pollination on 7th April.

3. *Fraxinus oregona* × *F. excelsior.* Pollen gathered from two trees on 1st and 20th April; pollination on 23rd April.

These crosses were made at Kew; fruits collected and pitted on 1st October, 1913. Seedlings of (1) and (2) expected next spring. Though fruit in quantity was formed on the Oregon ash, none contained seed. As in 1912, for some unknown reason, *F. oregona* does not appear to have been fertilised by the pollen of the common ash, though the stimulus of the pollen is sufficient to excite the formation of well-shaped fruits.

1914.

A.—The following crosses were made at Kew during the Spring of 1914, Mr. A. Osborn being in charge of the experiments.

	Stigmas isolated.	Pollen Collected.	Pollina-tion effected.	Seed Collected.
Laux leptolepis x L. dahurica*	20 Feb.	11 March	17 March	25 Sept.
" dahurica x L. europaea	17 March	27 March	28 March	25 Sept.
" europaea x L. leptolepis	20 Feb.	11 March	14 March	Failed
" europaea x L. dahurica	20 Feb.	11 March	14 March	"
Populus candicans x P. berolinensis	6 March	17 March	19 March	Failed
" " x P. robusta†	6 March	24 March	25 March	"
" " x P. nigra italica	6 March	25 March	25 March	"
" " x P. trichocarpa	6 March	23 March	25 March	"
Populus nigra italica x P. berolinensis	16 March	17 March	19 March	"
" " " x P. robusta†	16 March	24 March	25 March	19 June‡
" " " x P. trichocarpa	16 March	23 March	28 March	19 June‡
" " " x P. canescens	16 March	28 March	28 March	Failed
Populus angulata x P. robusta†	28 March	24 March	8 April	18 June‡
" " x P. nigra italica	28 March	25 March	8 April	18 June‡
" " x P. trichocarpa	28 March	23 March	8 April	18 June‡
" " x P. canescens	28 March	28 March	8 April	18·June‡
" " x P. tremula§	28 March	23 Feb.	8 April	18 June‡
Fraxinus oregona x F. excelsior	8 April	8 April	20 April	28 Sept.
" " x F. americana‖	8 April	22 April	24 April	Failed
" " x F. pennsylvanica¶	8 April	? April	24 April	28 Sept.
" " x F. lanceolata (two trees)	8 April	14 & 16 Ap.	20 April	28 Sept.
Fraxinus pennsylvanica x F. excelsior var. verticillata	9 April	15 March	9 April	Failed
" " x F. oregona	9 April	6 April	20 April	28 Sept.
" " x F. americana‖	9 April	22 April	24 April	Failed
" " x F. pennsylvanica¶	9 April	? April	24 April	28 Sept.
" " x F. lanceolata (two trees)	9 April	14 & 16 Ap.	24 April	28 Sept.
Fraxinus excelsior x F. oregona	21 April	6 April	24 April	28 Sept.
" " x F. americana‖	21 April	22 April	24 April	Failed
" " x F. pennsylvanica¶	21 April	? April	24 April	28 Sept.
" " x F. lanceolata (two trees)	21 April	14 & 16 Ap.	24 April	28 Sept.
Alnus oregona x A. firma	?	?	31 March	Failed
Quercus sessiliflora x Q. pedunculata	28 April	28 April	30 April	Failed
Q. pedunculata x Q. sessiliflora	30 April	26 April	4 May	Failed
Juglans nigra x J. regia	14 May	17 May	28 May	Failed
Juglans regia x J. nigra**	16 May	?	20 May	3 Oct.
Castanea sativa x Fagus americana††	5 June	—	—	Failed

* L. leptolepis x L. europaea and L. dahurica x L. leptolepis were also tried and failed.

† Pollen of *P. robusta* from a tree at Glasnevin.

‡ From the seed of these poplar crosses, sown one or two days after date of collection, numerous seedlings have been raised, which are very thriving, and will be described next year, as it is in their second year that poplar seedlings begin to show their vigour. Most of these are much taller than those sown in 1912, at the same age, i.e., end of their first season.

§ The pollen of *Populus tremula* was six weeks old when used, and had been kept between sheets of paper and not placed in a tube.

‖ The pollen of *Fraxinus americana* was obtained from a tree at Tortworth.

¶ The pollen of *Fraxinus pennsylvanica* was sent from Portugal.

** The pollen of *Juglans nigra* was sent from Portugal.

†† The pollen of *Fagus americana* was sent from the Arnold Arboretum, U.S.A.

B.—The following crosses were made in 1914 at Avondale by Mr. J. Black :—

19th March.—*Larix europaea* × *L. leptolepis*.

24th March.—*Cupressus Lawsoniana* × *C. nootkatensis*.

24th March.—*Cupressus Lawsoniana* × *C. macrocarpa*.

24th March.—*Cupressus nootkatensis* × *C. Lawsoniana*.

24th March.—*Cupressus nootkatensis* × *C. macrocarpa*.

26th March.—*Cupressus macrocarpa* × *C. Lawsoniana*.

23rd April. —*Fraxinus excelsior* × *F. oregona.*
14th May. —*Fagus sylvatica* × *Juglans nigra.*
14th May. —*Fagus sylvatica* × *Quercus pedunculata.*
24th May. —*Quercus pedunculata* × *Juglans nigra.*
24th May. —*Quercus pedunculata* × *Fagus sylvatica.*
24th May. —*Quercus pedunculata* × *Juglans regia.*
24th May. —*Quercus sessiliflora* × *Quercus pedunculata.*

Fruit appears to have formed at all the above crosses; but it is impossible to say if cross-pollination was really effected in the cases where species of different genera were selected.

C.—Two or three crosses attempted at Glasnevin with *Populus angulata* and a species of *Fraxinus* as mother-trees failed.

D.—The following crosses were made in April and May, 1914, at Dundrum, Co. Dublin, by Miss Crosbie:—

1. A common walnut (*Juglans regia*) was fertilised with *Juglans nigra* pollen received from Coimbra. No fruit was formed.

2. A common ash (*Fraxinus excelsior*) was selected as the mother parent, and the stamens were excised from as many flowers as could be conveniently handled. Pollen of *Fraxinus americana* from Coimbra and from Bussaco, and of *Fraxinus pennsylvanica* from Bussaco and Versailles (Trianon), was applied. Fruit was formed, which appears to contain good seed; and seedlings of the hybrids *F. excelsior* × *F. americana* and *F. excelsior* × *F. pennsylvanica* will be raised in 1916.

E.—The cross *Juglans regia* × *J. nigra* was attempted at 5 Sandford Terrace, Dublin, but failed. See p. 44.

IV.—Hints on Manipulation.*

Bags are used in order to exclude any pollen but that of the desired kind. Both male and female flowers are protected against stray pollen by bags. In the case of monœcious and diœcious trees, self-pollination is easily prevented, as branches can be bagged containing only one sex. In trees with perfect flowers, selected as the mother parent, the anthers should be removed before they dehisce, by a needle-pointed forceps. This operation is a delicate one, as if the style, stigma or ovary is touched, the pistil turns black and dies; it is nearly impossible to carry out on lofty trees, swaying perhaps in the wind. In ash, elm, and some other trees, with stigmas receptive some days before pollen is shed by the anthers, the pollen of another

* These hints are partly based on notes by Mr. A. P. Long, who carried out crossing experiments at Cambridge, at Highnam, and in Devon.

species may be applied in the hope that it will cause cross-fertilisation; and removal of the anthers may be unnecessary. Naturally, both methods should be tried.

Bags of stiff paper are used. The neck of the bag should be closed round the twig by thin wire made tight to prevent movement of the bag on the branch. The twig selected for bagging should have as many flowers as possible. Some of the leaves, buds, etc., may be carefully removed to lessen the material in the bag and diminish the chance of the flowers being injured by rubbing.

Bags should never be placed on branches in wet weather, as if this is done they become infected with fungi. Bags are put on male flowers for about a week before the anthers dehisce, to exclude stray pollen brought by the wind, etc. Bags are kept on female flowers for about three weeks, i.e., two weeks before the stigmas are receptive, and one week after pollination.

Pollen spoils by keeping; but it often must be kept for some time, till the stigma of the female parent is receptive.* It is often obtained from distant countries, as France, United States, etc., where trees of the desired species, flowering early, can be found. It is best kept in a small glass tube either corked or plugged with cotton wool. Pollen is usually collected by cutting off the flowering twigs and placing them on white paper in a dry place for one or two days.

Pollen is applied with a camel's hair brush; and a minute quantity is sufficient for each stigma. The stigmas are to be pollinated when receptive, indicated by the presence on them of a sugary solution or by their change to a brighter hue. Pollen grains may not be able to germinate on the stigma of another species, and yet be capable of fertilising it, if germination could be induced. The transference of a drop of the substance secreted by the stigma of the pollen-bearing species to the stigma of the other parent might induce germination. The best time for pollination is in the warm part of the day, between 11 a.m. and 3 p.m. in early spring. Cold, wet days should be avoided.

Much remains obscure as to the real factors in cross-fertilisation of trees. In the successful crosses, the percentage of seeds that germinate is small; and the vigour of the seedlings is not always uniform. To obtain large quantities of seed is an important object. It is essential, then, to increase considerably the number of these experiments, and to perform them under as many varied conditions as possible.

* In crossing two species which flower at different times it must be borne in mind that while pollen may be preserved for days, or in some cases for weeks, the stigma is only receptive for a short period.

TECHNICAL EDUCATION FOR BOYS IN LONDON.

By J. C. Smail, B.Sc.

Organiser of Trade Schools for Boys—Education Committee, London County Council.

London, on account of its size and cosmopolitan character, presents an exceedingly complex problem which comprises practically all the elements found in the problems of provincial towns. In London practically all children remain at school until 14 years of age, and those who leave before that age must qualify by examination for a labour certificate. There is thus a notable difference between London and certain other parts of the country, particularly Lancashire, and the somewhat higher age of leaving school is naturally reflected in the subsequent work in continuation classes.

Further education is carried on in the following ways :—

I. *Day Courses.*—(i.) Secondary Schools, (ii.) Trade or Junior Technical Schools, (iii.) Central Elementary and Higher Grade Schools, (iv.) Part-time Day Classes.

II. *Evening Courses.*—(i.) Junior Evening Institutes, (ii.) Polytechnics, Technical Institutes, Senior Commercial Institutes, Schools of Art and other institutions, such as the School of Economics and the Working Men's College.

In addition there are a large number of private venture colleges—technical, commercial and general.

A comparatively small number of pupils pass from elementary to secondary schools after the age of 14. It is the Council's policy, by means of a system of Junior County Scholarships, to transfer from elementary schools, at the age of 11 to 12, those who are qualified to profit by secondary school education, but who would not normally be able to secure it owing to financial limitations.

A general examination of those eligible by reason of age and attainment is held, but it is not the case that all children of ability are thus transferred, as in certain cases parents may not see their way clear to avail themselves of the advantages afforded by a secondary education. It is not proposed to discuss secondary school work. It is enough to say that a scholarship system of the magnitude of the Council's, opens up some new and important problems of curriculum and subsequent employment.

Trade schools have been developed separately for boys and for girls. The first of the trade schools for boys was founded in Shoreditch Technical Institute in 1904, and its operations are directed chiefly to furniture making and the woodworking industries. Subsequently schools on similar line were founded for different trades in the following order:—

Day Trade Schools.

1904—Shoreditch Technical Institute—Furniture Making.

1906—Paddington Technical Institute—Engineering.
Poplar School of Engineering—Engineering.
Central School of Arts and Crafts—Silversmithing.

1907—Borough Polytechnic—Metal working trades.

1908—Brixton School of Building—Building.

1909—Central School of Arts and Crafts—Book Production.
Beaufoy Institute—General Trade Training.
School of Art Wood-carving—Wood-carving.
Regent Street Polytechnic—Tailoring,
—Motor Body Building.

1910—Hackney Institute—Engineering and Building.
Westminster Technical Institute—Cookery.

1911—Westminster Technical Institute—Professional Waiting.

1913—Northern Polytechnic—Building Trades.
Woolwich Polytechnic—Engineering.
School of Photo-Engraving and Lithography—Photo-Process Work.
Brixton School of Building—Painting and Decorating.

In addition to these schools a School of Bakery and Confectionery has been conducted for some years at the Borough Polytechnic, but this is designed chiefly for boys of 16 years and over. The trade schools are, broadly speaking, intended for boys between the ages of 13 and 14 at entry, who will spend two or three years in training. The School for Waiters is organised for a one year course, but the other schools are organised for two or three year courses. Boys are thus about 16 years of age at the end of such training, and are prepared to enter definitely into industrial life as apprentices, learners, or improvers. In some of the trades apprenticeship is non-existent, and it is not possible to secure a regular training. The object of the schools is not, however, to replace apprenticeship, but to give boys such an initial training in handicraft and in the scientific principles underlying the operations of the group of trades

TECHNICAL EDUCATION FOR BOYS IN LONDON.

Fig. 1.—L.C.C. Westminster Technical Institute—School for Waiters—Part of the Daily Routine

TECHNICAL EDUCATION FOR BOYS IN LONDON.

Fig. 2.—L.C.C. Westminster Technical Institute—Cookery and Waiters' School—The Serving Room.

with which they are connected as will make them valuable assets upon entering the workshop, and will enab'e them to adapt themselves readily to workshop conditions. Character, cultivated intelligence, and adaptability are aimed at, and it is realised that the capacity to learn without too much supervis'on is of far greater value at this stage of life than any information or skill which can be picked up before entering the workshop. Trade schools have been called "the ideal system of training boys" by a leading printer, but they are costly and are likely to reach only a limited percentage of young people in the near future. At the present time there are approximately 1,100 boys in these schools, while there are in London approximately 33,000 boys eaving elementary schools each year. It is estimated that two-thirds of this latter number enter unskilled trades, and it is doubtful whether any large proportion of those who begin n unskilled work ultimately rise to skilled labour.

Central Elementary Schools.

Central Elementary Schools were initiated by the Council in 1911, and are divided into those with an industrial and those with a commercial bias. Fifty schools of this kind are in operation and more are projected : the number of pupils attending such schools is at the present time approximately 16,500. Some of these schools were formerly classified as higher grade schools; others are new and have been created specially for this purpose. The course extends over four years, during which specialisation takes place for commercial or industrial life. The pupils are drawn from elementary schools, between 11 and 12 years of age, after those who have qualified for transfer to secondary schools have been removed. There is, consequently, no appreciable removal of pupils of 14 years of age from elementary to central schools. The normal school age over the four years of the course is 11½ to 15½. There are also 14 higher grade schools with 7,500 pupils.

The advantages that Trade and Central Schools possess lie in their definite aim and their definitely planned courses.

Organisation of Evening Institutes.

The system of Evening Schools was re-organised in 1913 by the Council, and the re-organisation took effect during the past session. The scheme of organisation provides junior institutes for students from 14 to 18, and senior institutions. The junior institutes are divided into Junior Commercial Institutes, Junior Technical Institutes, and General Institutes, while Women's Institutes take both junior and senior students. Institutions for students of more advanced years with a minimum of 17 years are classified as Commercial Institutes, Polytechnics, Technical Institutes, Schools of Art, Schools of Arts and Crafts, and

Non-Vocational or Literary Institutes. There are also Free Schools in poorer districts and Schools for the Deaf. The main object of the re-organisation scheme was to endeavour to secure better attendance; records of past years showed that out of 120,000 students, 40,000 failed to make 14 hours' attendance during the session. The reorganisation has already succeeded in effecting a marked improvement in this respect.

It is now intended that students entering junior institutes after the age of 14 should remain there for two years before proceeding to the higher courses. The principles on which the re-organisation proceeded were broadly the classification of institutes according to type, the setting free of responsible teachers for part of their time, so that they might become fully acquainted with the needs of their locality and students, the partitioning of the whole County into definite areas allocated to particular institutes and beyond the confines of which responsible teachers do not go to visit employers or students except with the consent of their colleagues in the adjoining districts, the systematic canvassing of employers, the co-operation of day work teachers, and the co-operation of clubs, brigades and organisations for boys' welfare.

There are thus focussed upon the boy who has just left day school the efforts of the day school teacher, the evening institute responsible teacher, and possibly the employer and the parents. Strenuous efforts have been made to direct attention to the facilities available in evening work. Particular attention has been given to advertising; the press and the pulpit alike have lent a helping hand; while tramways, motor buses, and kinematograph houses have been utilised.

A meeting at the Mansion House was held; this has been followed by meetings of employers, club leaders, and brigade leaders in different districts, and there has been very vigorous canvassing. It is, however, a matter of extreme difficulty to get some employers interested in the welfare of their young people. The whole conditions of the London problem tend to make anything outside the immediate employment of young persons a matter of indifference to employers. Opportunities for thorough training in workshops or factories are comparatively rare. Labour is generally plentiful, and there is much moving about from one job to another; through its fluidity as well as on account of modern factory methods, it tends to become increasingly low grade. It is a matter for congratulation that under the re-organisation scheme a considerable number of the younger people who have just left school have been secured in attendance.

TECHNICAL EDUCATION FOR BOYS IN LONDON.

Fig. 3.—L.C.C. School of Building, Brixton—Modelling Room.

TECHNICAL EDUCATION FOR BOYS IN LONDON.

Fig. 4.—L.C.C. School of Building, Brixton—Decorating Workshop.

In Junior Commercial and Junior Technical courses students are required to attend for three nights weekly, and to take up definite courses of study which are laid down for them by the Council. These courses, based upon occupations, aim at technical, general, and physical education, and are limited to two years.

Courses of Study.

In the Junior Commercial Institutes, four courses are laid down—(i.) Shorthand; (ii.) Bookkeeping; (iii.) Commercial; (iv.) Language. A typical allocation of time is as follows:—

Shorthand Course—1st Year.

	hrs.	
Shorthand . . .	3	on separate evenings.
English . . .	1	
Tutorial . . .	1	
and any one of the following subjects:—Gymnastics, Drawing, Business Methods and Office Routine, Commercial Correspondence, Commercial Arithmetic, Elements of Commerce, Music.	1	
Total .	6	hours per week.

Shorthand Course—2nd Year.

	hrs.	
Shorthand . . .	3	on separate evenings.
English . . .	1	
Tutorial . . .	1	
and any one of the following subjects:—Bookkeeping, Elements of Commerce, Business Methods and Office Routine, Gymnastics, Drawing, Music.	1	
Total .	6	hours per week.

The other courses are similar, but the main subject is Bookkeeping in the Bookkeeping Course, Elements of Commerce, Commercial Geography and History in the Commercial Course, and either French or German in the Language Course.

In the Junior Technical Institutes approximately 30 courses are offered, and these are specialised according to the occupation of the student. The following are amongst the Courses arranged:

Technical Courses.

General Technical: Engineering Trades, Pattern-making, Wiremen's Work, Instrument making, Metalplate Work, Electro-Plating: General Building, Plumbing, Carpentry, Painting and Sign Writing, Gas Fitting: Cabinet-making, Wood-carving, Motor-body Building and Carriage and Van Building, Piano Construction, Upholstery,: Printing, Book-binding, Photo Process Work: Art Metalwork, Silversmithing and Jewellery, Engraving: Tailoring, Bootmaking, Hairdressing, Optical Industries, Watchmaking, Chemical Industries. Students are only admitted to specialised trade courses who are engaged in the trade: others may join the General Technical Course. A typical allocation of time is as follows :—

Instrument Making Course.

	1st year hrs.	2nd year. hrs.
English . . .	1	1
* Gymnastics or Tutorial .	1	1
Calculations . .	1	1
Drawing . . .	1	1
Trade Work . .	2	2
Total .	6	6 hours per week

* 2nd year Gymnastics or Elementary Science

The aim of the technical courses is to devote one evening to trade work, one evening to the technology of the trade, and one evening to English and Gymnastics.

General Institutes take both Junior and Senior Students, and are usually placed in outlying districts difficult of access, where the facilities for specialised instruction are limited.

It is not possible here to discuss the work carried on in Polytechnics, Technical Institutes, Schools of Arts and Crafts, etc., but all Junior Institutes have been carefully linked up with higher institutes, and very close and cordial relations have been secured.

Literary or non-vocational institutes call for notice, however, as they constitute a new departure modelled to some extent on the

Fig. 5. L.C.C. School of Photo-Engraving and Lithography Photographic Studio.

Fig. 6.—L.C.C. School of Photo-Engraving and Lithography Etching Room.

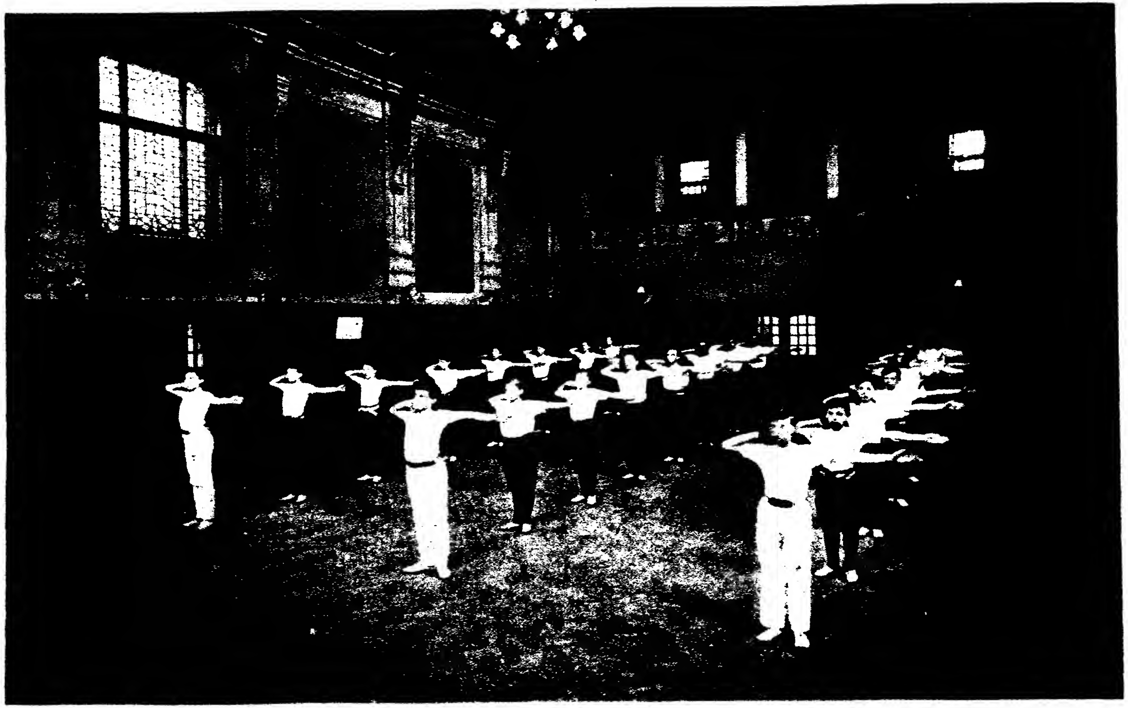


Fig. 7.—L.C.C. Beaufoy Institute—Physical Exercises.

Working Men's College, with which such names as Ruskin, F. D. Maurice, and Rossetti are associated, and also on the efforts of the Workers' Educational Association. Courses in literature, languages, history, economics, appreciation of music and of art are provided, and attendance is limited to students over eighteen years of age.

The value of time given voluntarily in the evenings is great: it is important that it should be utilised to the best advantage, that the best type of instruction should be provided, and that courses suitable to individual needs should be presented. Young people cannot be expected to realise the most beneficial training, and may waste much valuable time if left to select their own studies. Traditions of the value of organised courses are now being rapidly created in junior institutes.

Part Time Day Classes.

In addition to the day and evening work which has been outlined, and apart from the whole-time day technical courses such as are carried on for engineering and other students, efforts have been made to organise day classes for those already engaged in occupations. A number of such classes has gradually grown up, and the advantages have been very marked in the case of work done during hours when teachers and students are fresh. Difficulties of grading are, however, considerable with the small groups of students usually available. The following instances may be quoted :—

Classes are conducted at the Tramways depot of the Council, where engineering and other apprentices are required to attend during working hours for four hours weekly. A number of firms in the printing trades allow their apprentices off on one or more afternoons per week to attend classes held from 2.30 p.m. in printing centres. Afternoon classes are also conducted for lithographers and for photo-process workers. Classes are conducted in furniture-making and design for apprentices who are allowed off on one whole day per week. Classes are conducted on Saturday mornings for silversmiths. A scheme is in operation by which a large gas company allows its apprentices to attend a technical institute for three afternoons during the first year of their apprenticeship, and for one whole day during the second year of their apprenticeship. An experiment has recently been conducted by a well-known optical instrument-making firm which has allowed its apprentices to attend classes in two groups, each group receiving instruction on three days a week from 9 a.m. to 1 p.m. for twelve hours weekly for a period of two months.

In many cases employers are convinced of the value of technical instruction as an adjunct to the workshop training, and the existence of these classes shows that "time off" is not an impossible or visionary solution of further training. At the same time, let it be remembered that these results rest on a very slender basis of good-will, and that they have been achieved with great expenditure of effort. It must also be recorded that other efforts have been initiated, a number of which have fallen through after partial success, owing to firms changing their locality, or owing to changes of personnel, or for other reasons. There is a strong feeling amongst employers of the thinking kind that such attendance is desirable and possible: they do, however, feel that it is useless to expect much progress in this direction on a voluntary basis, as it imposes a direct handicap on the more enlightened employers. It is, however, stated by some employers that if all were compelled to do it, a general acceptance of the doctrine would speedily be found.

The Attitude of Employers.

There are certain features in London conditions without mention of which any outline of further education would be misleading.

London Conditions.

The size of the area renders any simple scheme impossible. The distance between home and workshop or office presents the problem of schools at the home, or at the works, or at both. The rapidly changing and developing conditions of transit by railways, tubes, trams and buses present an ever-changing and rapidly changing problem. There is a large floating population, who never learn their local geography thoroughly, and thus are fundamentally different from most provincial populations. There is constant immigration, both of foreigners and provincials, who take years to, or may never, learn the educational facilities available. Works of some kinds are relatively concentrated together; works of other kinds are distributed apparently haphazard over the whole area, hence there are great difficulties in specialising for instruction. There is, generally speaking, a want of that local patriotism found elsewhere which seeks expression in educational endowments, educational effort, and personal influence with young people. There are very numerous attractions and distractions, both good and bad, for young people. Much attention is given to moral, physical, and spiritual well-being by enthusiastic workers amongst boys, and in the direction of voluntary physical training and drill, London has organisations probably unequalled elsewhere. It is possible for a boy to proceed from the elementary school to the highest forms of evening instruction available entirely free of cost. There are exhibitions and scholarships by which a bright boy leaving the

elementary school at fourteen to earn his living may yet reach the University.

The Magnitude of the London Education Problem.

In round numbers there are 2,300 departments in elementary schools with 730,000 pupils: 100 secondary schools with 33,000 pupils: 24 trade schools with over 2,000 pupils: 64 higher grade and central schools with 24,000 pupils: 243 evening institutes of various types with 110,000 students; and 50 higher institutions—polytechnics, schools of art, etc.—with 50,000 pupils.

There are about 66,000 pupils discharged from elementary schools annually into the labour market, of whom less than 600 are under 14 years of age.

In round numbers, there are a million scholars of one kind and another, of whom—exclusive of students attending schools of the University—rather less than 200,000 are pursuing their education beyond 14 years of age in schools under public control.

The Voluntary System of Continuation Education.

The London system of continuation education is essentially voluntary; it provides ample opportunities for those who wish to utilise them, leading to the highest forms of education; it allows everyone to take or reject education after fourteen. The mass of the populace are turned out into, and remain in, the industrial whirlpool with no specialised education, and the majority of them will seek for none. We have heard of the "terminus ad quem" and "terminus a quo" in respect of teachers; we need to study this question in respect of the boy. Those who know boys of fourteen understand their joy at freedom from restraint: comparatively few of them are aching for knowledge, almost all are striving to earn and spend money. The mental attitude of the boy of fourteen is not one of carefully balanced ideals, or well-considered plans for future advancement; as a rule, he lays hold of one idea at a time, and that idea between fourteen and sixteen is seldom more education. Under any voluntary system a large percentage will never attend.

London and Britain may look with pride at the relatively large number of older students in evening work. How many of these are students because they have neglected their earlier opportunities? How much of the instruction is hampered by defective ground work, the result of years of neglect? Education is, above all things, a continuous process, and periods of neglect have to be paid for by strenuous overdrafts of time and energy.

I think it is wise to give every boy some years of specialised training beyond his general education : I feel that it is vital to our interests as a nation. Both low grade and high grade workers must be provided for, but in different ways. Our national attitude is too idealistic, looking to the perfect training of the few in place of the sound training of all. One great commercial firm recently wrote :— "It is not necessary now to attempt to prove that our junior assistants are inefficient. We know. . . ."

We, as educationists, are hampered by the unregulated, ill-adjusted relics of an apprenticeship system, by the excessive and indiscriminate use of juvenile labour, by long hours of work, and frequent overtime.

The Need for a National Policy.

Our efforts and experiments, and they are plentiful enough, show how the real problems can be solved—our solutions are only partial. It is clear, however, that there is no single simple solution of continued education. Any efforts at a greatly increased spread of continued education must be prefaced by a regulation and restriction of juvenile hours of labour. Healthy bodies are needed as much as healthy minds and trained intelligence. It is typical of our methods that some of the most valuable recommendations on this subject have arisen from a consideration of our Poor Laws. Our educational schemes of further education are very costly because they are partial, and dependent on too many uncontrolled factors. Our responsible teachers are always attendance officers, as well as educational experts : there is something healthy in this, but it is frequently and ultimately exhausting. Teachers must get and must retain, as well as teach, students.

What we need now and need urgently is a Royal Commission on Juvenile Labour to formulate a national policy in regard to the work, hours, training and education of the most precious asset of the nation—the young people. Education authorities alone cannot solve the problems as the issues involved are not only educational but social, medical, industrial and economic : and the administration falls upon three great and distinct departments of State—the Board of Education, the Home Office, and the Board of Trade.

The future holds great and momentous changes in labour, machinery, and methods. To meet coming industrial and economic stress, we require a sound and consistent national policy conceived on the broadest lines, and that policy has not yet been formulated.

REPORT OF THE SECOND IRISH EGG-LAYING COMPETITION.

By Miss L. Murphy, *Munster Institute, Cork.*

The Second Irish Egg-Laying Competition conducted by the Department of Agriculture and Technical Instruction for Ireland was held from 1st October, 1913, to 31st August, 1914.

On the removal of the birds entered for the first competition a very thorough cleaning and disinfecting was given to all the houses. The latter were dressed with wood preservative and the roofs freshly tarred and sanded. On the arrival of the new birds in September, 1913, the houses and runs were in excellent condition.

Breeds Competing.

The following breeds and varieties competed :—

White Wyandottes	..	11 pens.
Rhode Island Reds	..	11 ,,
White Leghorns	..	5 ,,
Brown Leghorns	..	3 ,,
Black Minorcas	..	4 ,,
Buff Orpingtons	..	3 ,,
White Orpingtons	..	2 ,,
Red Sussex	..	1 ,,
Light Sussex	..	1 ,,

Objects of the Competition.

Amongst the objects for which these competitions are held, the following may be mentioned :—

(1) To direct attention to the importance of increased fecundity in farm fowls ;

(2) to ascertain which breeders in Ireland have good laying strains ;

(3) to show that, while large incomes are not to be expected from poultry, stock of average quality will leave a good margin of profit over cost of food.

While the competition for prizes and certificates is confined to residents in Ireland and to birds bred in this country, the Department considered it advisable to test the value as layers of birds from their Stations where trap-nest records have been systematically kept for some years, and for this purpose a certain number of pens were entered from the Munster Institute and the Ulster Dairy School. The results of these pens are shown in Table B.

Second Year Hens.

A test was also made of two pens of second-year hens. The six hens used as a control pen in the 1912-13 Competition and a second pen of six sisters of these that had been included in the ordinary stock of the Munster Institute during the above-named period were taken and penned beside the pullets. These second-year hens were

kept under conditions of food and housing exactly similar to the pullets, but male birds were used in both pens from December to the end of the season.

When comparing the performance of these twelve birds it should be noted that during 1912-13 there was a male bird used and broodiness was more frequent in Pen 49, while in the other pen (48) which had been included in the 1912-13 competition no male bird was used. (See Table C.) It is proposed to continue this test in the coming year and to secure two of the pens with low records in the 1913-14 contest for this purpose.

Result of the First Competition.

It was hoped that the first competition would have in some measure turned the attention of the more skilful poultry keepers towards increasing the fecundity of their fowls. The results have far surpassed expectations, and the breeders of pure-bred fowls all over the country have felt the effects of this awakened interest.

Quality of Birds sent in.

No striking advance was expected for three years, but already in the Second Competition much better judgment has been shown in choosing pullets, and there is in consequence a considerable improvement in the returns.

At the same time it must be again noted that the chances of some of the pens were spoiled by too late hatching, while others that were hatched too early moulted during the time of greatest egg scarcity and highest prices, and, consequently, were unable to make a good record.

Danger of Early Laying.

The time to hatch depends on the strain and on the skill of the feeder. With very prolific strains and in the hands of good rearers, the tendency always is to lay at from four to five months old, the difficulty being to prevent egg production once the latter age is reached.

This premature laying is bad for the pullet, causing stunted growth, and also for the egg, as it rarely attains good marketable size in the first year, and sometimes fails, even in the second year, to reach the minimum standard of two ounces. It almost invariably happens that these early layers prove to be the best in the flock, and it would be fairly safe to pick them as heavy layers on this performance alone, but, nevertheless, too early laying is a mistake from every point of view.

Some of the birds sent in weighed only 2 to 2½ lbs., and such birds are useless from a competition point of view. It would be desirable to have non-sitters 3 lbs. each and general purpose breeds 4 lbs. each on arrival, and many early pullets in good condition exceeded these weights. The Australian standard is 3½ lbs. for Leghorns.

Weight of Pullets.

In the 1912-13 report a passing reference was made to the fact that competitors who were Egg Station holders under the Department's Schemes, and consequently obliged to obtain fresh blood every year, described their birds as of one particular strain. A very striking instance of this occurred in the competition just closed. A competitor sent in pullets for both tests, but those of 1912-13 were quite different in laying powers, size of egg, and type of bird from those sent the previous year. They are both described as of same strain. What happened in this case is of very frequent occurrence. Male birds from hens of low records were used, and the pullets inherited the bad laying of their grand-dams instead of the good laying of their dams.

What is a Strain ?

To be able to claim that birds belong to any fixed strain they must contain a minimum of three-fourths of that one line of blood, and, no doubt, many breeders would question if even one-fourth alien blood would not debar the birds from recognition by the original founder of the strain.

In some well-known strains the type of the birds, size and shape of egg, as well as colour and texture of shell, are very marked, and anyone familiar with these strains can easily recognise them. Where a pen of pullets is described as belonging to any of these strains and is found to contain various types of birds that lay still more varied types of eggs, it is clear that more than one strain has been employed.

Many breeders appear to think that in order to breed good layers all that is necessary is to use hens with high laying records. The work of Dr. Pearl indicates that this theory is quite wrong. Laying appears to be transmitted by a heavy layer through her sons to her grand-daughters, hence the real value of high record hens is for cockerel breeding. For pullet breeding the male bird is of far more importance, and here it may be noted that it is the record of his dam that counts and not the record of his sisters.

Influence of the Male Bird.

As was stated in the Quarterly Report for April (see JOURNAL No. 3, Vol. XIV., page 545) the non-sitters were of decidedly better type than those of the previous year, and have come out much better at the finish, three pens of Minorcas being amongst the prize-winners.

Non-sitters.

Pen 7 (White Leghorn) would have stood much higher had the pullets been a little earlier. They were of admirable type and exactly what utility Leghorns ought to be. They should give a good account of themselves as a breeding pen during the coming season. The heaviest eggs in the Leghorn section were laid by Pen 37, but although March hatched they were very backward on arrival and showed no signs of springing combs for fully eight weeks. They were of the modern exhibition type. Some cases of broodiness occurred among the Brown Leghorns and Minorcas, but the White Leghorns were quite free from this fault.

General Purpose Breeds.

The White Wyandotte has again upheld its reputation by winning 1st Prize. By a curious coincidence the same breed and the same pen number have won both competitions. Most of the birds were of good utility type, but in some cases the eggs were rather small.

Minimum Size for Hatching Eggs.

A minimum of 25 ozs. to the dozen should be insisted upon when choosing eggs for hatching, and in cases where the eggs of second-year birds are below this standard a male should be purchased from a breeder who will guarantee that the dam is not only a heavy layer but that her eggs are of good size. Such birds may cost a little more, but the money will be very well spent.

Very Large Eggs.

At the same time it should be observed that very large eggs, such as were laid by Pens 29 and 32 (White Wyandottes), are not consistent with a high degree of prolificacy. The breeder who works up a heavy laying strain of Wyandottes, with an average of 24 ozs. to the dozen for pullets' eggs and 25 ozs. to 26 ozs. for second-year hens, will be doing good work for this breed in Ireland.

The Rhode Island Reds.

Rarely has a better illustration of the value of strain been observed than amongst the pens of Rhode Island Reds. Putting aside some few pens that were completely spoiled by too early or too late hatching, the others seemed fairly typical of their breed. The best eggs for size and colour came from this section. Some pens, notably Nos. 20, 21 and 24, laid very large eggs of a rich brown colour, and anyone familiar with the keeping of individual records could have told at a glance that such size and colour are signs of poor laying. In breeding Rhode Island Reds or any general purpose breed for high prolificacy, the tendency is to lose size and colour of egg in direct ratio to increase in number. With care, sufficient size can be retained, but the deep brown colour so much prized must be

sacrificed to numbers, so that the consumer who requires large size of egg combined with rich colour must be prepared to pay the extra cost of production.

Heavy Breeds.

As might have been expected, the heavy breeds, such as Sussex and Faverolles, have almost disappeared from the competition. There can be no conceivable object gained in turning white-shanked birds with good table qualities into heavy layers, if by doing so the table qualities are lost. Some excellent layers can be found amongst such breeds, as for example pullet No. 92 in Pen 16, which made the remarkable score of 233 eggs in eleven months and wins the special prize of £1, but whilst there are Wyandottes, Rhode Island Reds, White Leghorns, Minorcas and Brown Leghorns, there is ample material for the producer of laying strains to work upon without spoiling the distinguished quality of our white-fleshed breeds.

The Barred Rock, which has been steadily declining in popularity during recent years, has quite disappeared from the competition, and seems likely to follow the Buff Rock which was such a failure at the Egg Stations. The decline of the Barred Rock is undoubtedly due to too much importance being attached to colour and too little to type.

Changing Breeds.

Another feature which deserves to be noted is the number of competitors who changed breeds during the year. This is always the mistake of the novice. Success can be most easily obtained by taking up one breed, having first given due consideration to soil, situation and type of bird doing best in the district. Once chosen, persistent efforts to improve this breed will result in success.

Feeding.

The feeding was carried out on the same lines as in the previous competition. The plainest foods, such as could be obtained by any farmer, were alone used. Hens that will not lay on such foods are useless as farm stock. It might have been possible by forced feeding to raise the average production by a few eggs, but the extra cost would have been too great, and there is always the risk in forced feeding of injuring the birds for the breeding pen.

Except on wet mornings, the first feed was usually of mash* (given

* The stock food mixture was as follows :—

4	parts	Indian meal	To this was added about one-third bulk of cooked vegetables or cut clover.
2	,,	pollard (fine)	
1	,,	tailings (thirds)	
2	,,	bran	
1	,,	meat meal or fish meal	
½	,,	linseed cake meal	

In summer the quantity of Indian meal was reduced by one-half.

Method of Feeding. warm during the winter months). The average quantity given was a pint to every six birds. During bad weather, and especially when egg production was heaviest, the morning mash was immediately followed by a sprinkling of grain in the litter; this kept the birds active during the morning hours. At noon, mash or grain was given according to the state of the weather, and in the evening a full pint of heavy oats or a mixture of oats and crushed maize was given to each pen. On days when no soft food had been given at noon, the evening feed was of mash, as much as the birds would eat. The changes in the kinds and quantities of foods used were regulated by the condition of the pullets, state of the weather, and number of eggs being produced.

Green Food. The provision of a regular supply of fresh green food again proved a difficulty, and clover meal had to be purchased to make good the deficiency.

Fresh water, grit and shell were supplied *ad lib.*, and it is interesting to note that the consumption of the two latter items is much heavier than in the previous competition. The runs and the gravel squares round each house had furnished a considerable supply during the first year.

The following table shows the kind and quantity of food used during the competition :—

Foods Used.

	Quantity
Maize (crushed)	12 cwts.
Maize Meal	22½ ,,
Oats	109¾ ,,
Pollard	20 ,,
Thirds	14 ,,
Bran	18½ ,,
Rice Meal	2 ,,
Linseed Cake Meal	1½ ,,
Malt sprouts	5¾ ,,
Meat Meal	4½ ,,
Fish Meal	8 ,,
Clover Meal	3½ ,,
Turnips and Mangels	11 ,,
Cabbage (drumhead)	12 doz.
Grit and Shell	9½ cwt.
Milk (separated)	151 gall.

Reference to the table will show that less ground grain was used than in the previous competition.* This was due to the fact that the practice of giving meals in hoppers was discontinued as it encouraged the attacks of rats. Less crushed maize was also used as excellent potato oats were obtained, and this grain was used exclusively during mild, open weather. Maize meal, however, always formed about one-fourth of the total soft food in winter. As a winter egg producer no cereal has been found to equal it, and when properly used with other foods no harmful results follow.

* See JOURNAL, Vol. xiv., No. 1, p. 10.

It will also be noted that fish meal, given in the proportion of one-tenth of the total soft food, has taken the place of some of the more expensive meat meal.

Fish Meal.

The following figures show the cost of feeding during the four periods of the competition :—

		£	s.	d.	Average cost per Bird per Week. d.
1st Qr. Oct.-Dec. (13 weeks)	....	21	14	1½	1·36
2nd Qr. Jan.-March (13 weeks)	....	25	8	1½	1·6
3rd Qr. April-June (13 weeks)	....	21	9	10½	1·35
4th Qr. July-Aug. (9 weeks)	....	15	0	7½	1·36

The total cost of food for the 294 pullets works out at £83 12*s*. 9*d*. or an average of 5*s*. 8·3*d*.

The following table gives the number of pullets penned, number of eggs laid, value of eggs sold, profit over cost of food, gross and net returns per bird, and average value of eggs :—

No. of Pullets Penned.	No. of Eggs laid.	Return from Eggs sold.	Profit over cost of food.	Av. gross return per bird.	Av. net return per bird.	Av. Price received for Eggs.
	Doz.	£ s. d.	£ s. d.	£ s. d.	s. d.	d.
294	3,401	195 4 3	111 11 6	0 13 3¼	7 6·95	13·77 per doz.

For the second competition these figures must be considered satisfactory. In a test like this the important points are the average return and the cost of production. The return from the top pens is of very little importance compared with the average return, and the price received for eggs is not more important than the cost of producing them.

The Two Main Points.

Marketing was done in the same manner as in 1912-13. Three times a week the eggs were delivered to shops and private customers, the ordinary market cart (which delivered butter at the same time) being used for the purpose. Returnable boxes were used, except in the case of parcel post customers, and it may be noted here that the three-ply boxes with cardboard divisions, purchased in September, 1912, are still in quite good condition.

Marketing.

This method of marketing is that which would be adopted in any farm near a large town. If the milk on the Munster Institute farm was not required for butter-making it would have to be delivered daily to private customers, and in this case daily delivery of eggs would be possible, but for all practical purposes the method employed secures to the consumer a very superior egg.

In this case the bulk of the eggs went to one shop. The average price paid was slightly higher than the average price of farm eggs but lower than the average wholesale price of eggs in Dublin or Belfast. The eggs being guaranteed to be not more than 48 hours old (except in the case of those laid on Fridays, which were three days old when sold) and all infertile, were decidedly superior to any that could be purchased in the open market. At the same time it is quite easy for any poultry keeper to produce eggs of similar quality even though the marketing three times a week might prove a difficulty.

Average Weight of Eggs.

Below are given interesting figures relating to the exact weight of eggs laid by pullets of the different breeds in the competition :—

Breed.	No. of Pullets Penned.	No. of Eggs Laid.	Average Weight per doz.
W. Wyandotte	66	9,263	24·6 oz.
Rhode I. Red	84	11,864	24·96 „
White Leghorn	42	5,853	25·47 „
Brown Leghorn	18	2,165	24·66 „
Black Minorca	24	3,498	26·47 „
Buff Orpington	18	2,440	24·54 „
White Orpington	12	1,660	24·62 „
Sussex	18	2,471	23·93 „

Health and Stamina.

The health of the birds generally was good ; 13 birds died and 12 of these were replaced. There were only three cases of tuberculosis during the year. There was a considerable improvement in the stamina of the pullets, and there was but little trouble from colds or minor ailments.

Value of Manure.

In dealing with such a large number of hens manure forms a most valuable by-product. It is estimated that 100 large fowls will produce 4 tons of moist manure in the year, worth for many purposes 30*s*. per ton. Assuming that the value of the manure from each pullet is worth 1*s*., the return under this head alone works out at £14 14*s*. On an ordinary farm this might very reasonably be put against the green food, roots, milk and litter used, and still leave a surplus in favour of the poultry.

Prizes.

Prizes were offered for the eight pens producing eggs of highest market value, and a Second Class Certificate for every pen producing an average of 160 eggs.

Prizes have been awarded to pens owned by the following :—

1st Prize, £5 ; Second Class Certificate :—

Mrs. Strong, Moate House, Kells, Co. Meath (White Wyandottes).

2nd Prize, £4 :—

Mrs. Diver, Tiernaleague, Carndonagh, Co. Donegal (Black Minorcas).

3rd Prize, £3 :—

Mrs. Strong, Moate House, Kells, Co. Meath (White Wyandottes).

4th Prize, £2 :—

Mrs. Ludgate, Gortbofiney, Lombardstown, Co. Cork (Black Minorcas).

5th Prize, £1 10*s*. :—

Mrs. Harris, Adamstown, Knocklong, Co. Limerick (Black Minorcas).

6th Prize, £1 5*s*. :—

Mr. Kirkpatrick, 4 Leinster Terrace, Clondalkin, Co. Dublin (W. Wyandottes).

7th Prize, 15*s*. :—

Mrs. M'Gowan, Drumadorn, Cloone, Co. Leitrim (Buff Orpington).

8th Prize, 10*s*. :—

Mrs. Cormack, Ballykerrin, Ballincurry, Thurles, Co. Tipperary (Buff Orpington).

Special Prize of £1 :—

(1) for the pen making the highest score from the 1st October, 1913, to the 31st January, 1914 ;

(2) for pullet of the non-sitting breeds making the highest score during the competition ;

(3) for the pullet of the sitting breeds making the highest score during competition—

(1) Mrs. Strong, Moate House, Kells, Co. Meath.

(2) Mrs. Diver, Tiernaleague, Carndonagh, Co. Donegal.

(3) Mrs. Dowling, Ballybitt, Tullow, Co. Carlow.

Tables A and B show in detail in order of value the various pens, the names of the principal winning owners, the date of hatching, weights, number and value of eggs laid by each pullet, and the total number and value of eggs from each pen.

Table C gives a comparison between the return from first- and second-year hens.

TABLE

Order of Merit.	No. of Pen.	Breed, Time of Hatching, and Owner.	No. of Pullet.	Weight. On Arrival lbs. oz.	Weight. At close of Test. lbs. oz.	Eggs Oct.	Nov.	Dec.	Jan.
			181	3 8	4 0	—	10	10	19
1	31	White Wyandotte. [February]	182	3 12	4 0	—	—	8	23
			183	3 8	4 0	12	22	24	21
		(Mrs. Strong,	184	4 4	5 8	—	23	24	18
		Moate House,	185	4 0	3 12	22	16	18	21
		Kells, Co. Meath.)	186	3 8	4 8	—	—	3	22
2	2	Black Minorca. [March]	7‡	3 12	—	—	12	18	19
			8	3 4	3 12	—	17	23	17
		(Mrs. Diver,	9	3 8	4 4	1	3	23	23
		Tiernaleague,	10	3 8	3 8	—	15	16	17
		Carndonagh.)	11	3 12	4 0	—	19	20	20
			12	3 8	3 12	—	—	2	16
			175	3 12	4 8	—	22	25	22
3	30	White Wyandotte. [February]	176	3 0	3 4	—	10	24	18
			177	3 8	3 12	15	21	19	12
		(Mrs. Strong,	178	4 0	4 8	—	—	20	8
		Moate House,	179†	4 8	5 0	11	—	14	18
		Kells, Co. Meath.)	180	4 0	4 12	14	3	22	22
4	1	Black Minorca. [17th March]	1‡	4 8	—	—	19	19	21
			2	4 8	5 8	—	—	16	21
		(Mrs. Ludgate,	3	3 12	5 0	—	—	12	21
		Gortbofiney,	4	3 12	4 12	—	6	23	22
		Lombardstown,	5	3 12	4 8	—	—	18	18
		Co. Cork.)	6	4 4	5 12	—	8	19	19
			13	4 0	3 8	—	7	21	21
5	3	Black Minorca. [Mar. & Apr.]	14	3 12	4 8	3	19	15	12
			15	4 0	4 8	—	7	20	19
		(Mrs. Harris,	16	3 12	4 8	—	—	11	20
		Adamstown,	17	3 8	4 8	—	—	15	12
		Knocklong.)	18	3 4	4 0	—	—	16	21
			163	3 12	4 0	5	22	14	16
6	28	White Wyandotte. [6th March]	164	3 12	4 4	—	9	21	18
			165	4 0	4 0	—	9	25	21
		(Mr. Kirkpatrick,	166	3 12	5 4	—	22	24	21
		4 Leinster Terrace,	167	4 8	5 4	—	—	—	15
		Clondalkin.)	168	3 12	4 12	—	—	5	20
			67	3 8	4 8	—	12	25	18
7	12	Buff Orpington. [March]	68	4 12	6 4	—	—	23	24
			69	4 12	5 0	—	—	—	9
		(Mrs. M'Gowan,	70	4 4	7 0	—	22	23	16
		Drumadorn, Cloone,	71	4 12	5 8	—	20	25	24
		Co. Leitrim.)	72	3 8	4 8	—	—	7	19
			61	4 4	5 8	—	—	12	23
8	11	Buff Orpington. [March]	62	4 4	5 8	11	21	20	22
			63	5 0	5 8	—	—	20	15
		(Mrs. Cormack,	64	4 8	5 4	10	20	9	16
		Ballykerrin, Ballincurry,	65	4 12	5 4	16	4	2	16
		Thurles.)	66	5 0	5 8	—	—	21	20

* Signifies hen was still laying at close of competition.
† Signifies moulted.

A.

Laid. Feb.	Mar.	April.	May.	June.	July.	Aug.	Total per Hen.	Value per Hen. s.	d.	Untrapped Eggs.	Total Eggs from Pen.	Total Value of Eggs from Pen.	No. of times Broody.
17	24	24	19	17	22	21	183*	16	6				—
17	17	12	8	6	9	9	109	10	8¾				—
17	23	18	14	2	—	—	153	15	10¼				1
15	24	24	22	17	18	17	202*	20	1¼				—
11	24	18	16	10	11	5	172*	16	10			£ s. d.	7
22	26	26	25	25	26	25	200*	16	2½		1019	4 16 3	—
16	18	15	15	4	—	1	118	12	8¼				—
16	18	19	15	2	5	—	132	14	4½				—
21	26	24	23	21	16	25	206*	20	3¼				—
18	23	23	17	12	16	22	179*	17	8				—
18	24	22	16	7	18	19	183*	19	0¾			£ s. d.	—
13	18	18	18	17	5	19	126*	11	3½		944	4 15 4¼	—
23	23	24	19	14	18	10	200	20	2¼				—
14	21	15	11	10	2	14	139*	13	11½				2
16	24	16	15	14	17	9	178*	17	3¼				5
15	21	17	10	5	4	1	101	9	7				4
13	20	20	21	16	18	13	164*	15	9¼			£ s. d.	—
20	23	23	11	7	8	3	156	16	3½		938	4 13 0¾	—
20	24	25	20	13	8	5	174	17	9¾				—
19	24	17	18	7	—	16	138*	13	10¾				—
21	24	24	18	—	15	17	152*	14	10½				—
19	25	25	22	10	8	14	174*	17	6				—
18	22	23	14	11	—	13	137*	13	7¾			£ s. d.	—
20	26	25	20	2	—	—	139	14	2¼		914	4 11 10½	—
18	23	21	18	12	—	1	142	14	6¼				1
17	21	21	22	13	8	18	169*	17	3				—
18	20	23	22	18	20	13	180	17	8				—
21	20	19	13	‡	19	14	139	13	7¾				—
10	20	20	13	5	13	8	116	11	2½			£ s. d.	—
18	26	22	20	9	14	14	160	15	6¼		906	4 9 9¾	—
15	14	12	12	10	8	8	136	14	0				7
16	18	18	12	11	10	11	144*	15	0¼				5
19	23	17	17	11	11	10	163	15	7¾				4
16	23	17	17	12	9	10	171	17	4¾				2
15	21	22	24	18	20	18	153*	13	3¾			£ s. d.	—
19	22	8	17	11	10	15	127*	11	10		894	4 7 2½	6
19	25	22	11	15	15	14	176	17	7¼				4
20	24	25	17	16	9	16	174*	16	6¾				3
20	13	8	10	7	8	1	76*	6	9¼				5
9	21	18	15	15	8	10	157*	15	9½				2
20	23	22	17	11	7	8	177	17	3¾			£ s. d.	1
17	22	25	19	9	15	9	142*	13	0½		902	4 7 1	2
13	20	12	12	15	14	9	130	12	5¼				7
16	20	20	21	8	20	19	198*	20	6¼				1
12	26	11	13	10	12	—	119	11	5¾				5
14	19	18	11	12	11	9	149	15	6				5
10	7	16	15	14	4	13	117	11	6¼			£ s. d.	4
19	23	23	17	14	1	15	153*	15	3¼		866	4 6 8¾	1

‡ Original bird died and was replaced.

Table A.-

Order of Merit.	No. of Pen.	Breed, Time of Hatching, and Owner.	No. of Pullet.	Weight. On Arrival lbs. oz.	Weight. At close of Test lbs. oz.	Eggs Oct.	Nov.	Dec.	Jan
			157†	5 4	5 8	10	1	4	19
9	27	White Wyandotte. [22nd Jan.]	158†	4 4	4 0	20	2	22	19
			159†	5 0	4 12	—	—	2	21
		(Hon. Mrs. Vandeleur,	160	4 12	5 0	17	18	21	15
		Cahiracon,	161†	4 8	4 8	—	—	—	5
		Ennis.)	162	4 4	4 12	14	10	17	5
			223	4 4	6 12	—	11	22	23
10	38	Rhode Island Red. [March]	224	4 0	5 8	—	—	6	26
			225	4 4	4 0	—	—	15	18
		(Mr. Patrick Brennan,	226	3 12	3 12	8	21	13	19
		Walshtown,	227	4 4	3 12	—	—	—	12
		Kiltimagh.)	228	4 8	5 12	—	—	9	19
			37†	3 12	3 12	6	21	10	—
11	7	White Leghorn. [25th April]	38†	2 12	4 0	—	6	9	10
			39	3 0	3 8	—	16	21	18
		(Mr. D. K. O'Sullivan,	40	2 12	3 8	—	7	19	12
		89 Emmet Road,	41	2 8	3 0	—	5	22	17
		Dublin.)	42	2 8	3 8	—	5	24	19
			25	3 8	4 0	—	—	14	15
12	5	White Leghorn. [8th April]	26	2 0	3 0	—	5	22	22
			27	4 0	4 0	—	1	17	—
		(Miss M'Manus,	28	3 8	4 0	9	10	16	5
		Maguiresbridge.)	29	2 8	3 4	—	6	22	11
			30	4 0	4 4	13	12	16	—
			79	4 0	5 0	—	—	—	21
			80	4 8	5 12	—	—	—	15
13	14	White Orpington. [March]	81	4 4	5 8	7	17	24	6
			82	5 0	5 0	—	—	18	20
			83	4 0	4 4	—	—	—	9
			84	4 8	5 8	4	16	19	1
			133	3 0	4 8	—	1	10	6
			134	2 4	4 8	—	—	6	14
14	23	Rhode Island Red. [End of	135	3 8	4 12	—	—	6	16
		March]	136	3 8	4 0	—	—	5	7
			137	3 8	4 12	—	—	21	8
			138	2 8	4 0	—	—	12	19
			169	3 12	5 0	—	—	6	23
			170	4 4	5 0	—	—	—	14
15	29	White Wyandotte. [20th Mar.]	171	4 8	5 0	—	—	14	19
			172	3 12	4 8	—	6	22	21
			173	4 0	3 8	1	21	21	17
			174	3 12	4 8	—	—	19	18
			229	4 0	5 4	—	—	—	15
			230	4 0	5 8	—	—	22	24
16	39	Rhode Island Red. [Early Mar.]	231	5 0	5 0	—	11	22	18
			232	4 0	5 4	—	—	13	22
			233	4 0	5 0	—	—	—	20
			234	4 8	6 0	—	—	—	14

* Signifies hen was still laying at close of competition.

continued.

Laid. Feb.	Mar.	April.	May.	June.	July.	Aug.	Total per Hen.	Value per Hen. s. d.	Untrapped Eggs.	Total Eggs from Pen.	Total Value of Eggs from Pen.	No. of times Broody
17	22	22	17	9	13	7	141	13 2¾				3
16	22	21	17	9	9	21	178*	17 3				3
18	25	22	15	19	6	13	141	12 2¾				2
17	21	24	24	16	20	16	209*	21 7½				—
16	24	21	14	7	9	—	96	7 2¾			£ s. d.	3
14	19	22	20	14	12	12	159	14 7¾		924	4 6 2½	3
20	23	25	18	16	15	22	195*	19 9¾				3
23	24	18	15	14	14	20	160*	15 4				5
11	20	20	9	14	—	—	107	10 5				2
8	17	19	19	11	—	—	135	13 8½				6
19	22	10	13	—	13	1	90	8 1¼			£ s. d.	3
16	20	21	25	23	25	18	176*	16 0¼		863	4 3 5¾	—
1	24	26	21	21	7	—	137	12 10¼				—
3	24	19	21	7	3	—	102	9 1¼				—
9	18	24	22	16	—	18	162*	15 3¾				—
—	24	21	16	9	16	17	141	13 8				—
20	26	24	16	19	16	13	178	16 6½			£ s. d.	—
1	27	27	20	4	12	22	161*	15 6¾		881	4 3 0½	—
4	22	24	16	10	8	14	127*	11 9¾				—
21	26	26	16	18	17	18	191*	17 3½				—
5	23	23	23	17	17	7	133	11 9				—
8	23	24	23	21	16	14	160*	14 9¾				—
15	25	25	8	3	8	9	132*	13 2			£ s. d.	—
12	21	25	21	18	6	—	144	14 0¼		887	4 2 10¼	—
2	4	5	1	1	1	—	35	3 9½				3
18	21	16	14	11	—	—	95	8 2½				3
15	20	24	15	12	—	—	140	14 9¼				2
19	22	23	12	18	—	—	132	12 10¾	320			2
3	4	5	1	1	—	—	23	2 3¾			£ s. d.	3
4	16	16	12	13	—	—	101	10 5¼		846	4 1 11	3
—	18	20	16	14	12	2	99	8 8				—
12	15	20	20	13	13	14	127*	10 7¾				1
13	18	18	22	23	20	18	154*	13 8¼				—
2	20	16	25	20	16	—	111	8 7¼	139			2
6	18	19	14	17	14	13	130	12 0			£ s. d.	—
14	22	23	16	15	5	13	139	12 2½		899	4 1 7¾	—
20	25	14	10	12	11	8	129	12 3¾				6
11	24	23	21	20	20	15	148	12 8				—
7	18	14	11	9	1	13	106*	10 2¼				3
17	22	21	9	13	12	9	152*	15 2½				3
13	20	21	18	8	—	10	150	16 0½			£ s. d.	—
12	19	20	6	21	6	18	139*	13 11¼		824	4 0 4¼	2
18	22	21	19	12	18	11	136	12 2				1
19	22	16	14	12	5	6	140	14 4¼				4
18	22	24	23	17	—	19	174	17 10¾				1
19	22	13	14	11	14	16	144	14 3¼				5
19	24	19	15	8	10	13	128	11 8½			£ s. d.	3
19	21	20	11	7	20	—	112	9 9¾		834	4 0 2¼	3

† Signifies moulted.

Table A.-

Order of Merit.	No. of Pen.	Breed and Time of Hatching.	No. of Pullet.	Weight. On Arrival lbs. oz.	Weight. At close of Test lbs. oz.	Eggs Oct.	Nov.	Dec.	Jan.
17	18	Rhode Island Red. [March]	103	4 4	4 0	17	17	6	—
			104	3 8	5 12	—	—	11	18
			105	5 4	6 0	19	21	23	24
			106	4 0	4 8	—	—	7	19
			107	4 4	4 8	—	—	4	23
			108‡	4 0	—	—	—	—	17
18	19	Rhode Island Red. [January and March]	109†	3 4	4 4	12	22	22	6
			110	4 12	5 0	—	—	6	22
			111†	3 8	4 0	—	—	11	21
			112	4 4	6 0	3	—	22	22
			113	3 12	5 0	—	—	—	—
			114	4 0	5 8	—	—	18	24
19	6	White Leghorn. [March]	31	3 4	4 8	—	15	10	6
			32	4 0	4 12	—	1	20	20
			33	3 0	3 12	—	—	—	22
			34	3 0	3 12	—	—	13	13
			35	3 4	4 8	—	15	13	15
			36	3 8	4 4	—	6	20	20
20	42	White Wyandotte. [February]	247	3 12	5 8	—	—	1	14
			248	4 0	5 0	—	—	—	12
			249	4 0	5 12	—	—	—	11
			250	3 8	5 0	—	—	—	20
			251	4 4	5 0	—	—	—	21
			252	4 4	6 4	—	—	2	13
21	15	Red Sussex. [March]	85†	3 4	5 8	—	—	11	23
			86	3 4	4 8	—	—	17	15
			87	3 0	5 8	—	—	—	17
			88	2 12	4 12	—	—	16	22
			89	3 8	4 8	—	21	25	23
			90	3 4	5 0	—	—	5	23
22	10	Brown Leghorn. [2nd April]	55	2 12	3 12	—	6	16	15
			56	2 8	3 12	—	4	15	13
			57	2 8	3 8	—	—	2	7
			58	3 0	3 8	—	7	14	11
			59	3 4	4 0	—	—	—	15
			60	3 0	4 4	—	—	9	19
23	13	White Orpington. [12th Feb.]	73	3 12	5 4	—	—	—	17
			74	4 4	5 12	—	—	20	22
			75	4 8	5 4	—	—	—	14
			76	4 0	5 0	—	—	—	12
			77	4 0	5 0	—	—	—	12
			78	3 12	4 12	—	6	22	22
24	33	White Wyandotte. [Date not stated]	193‡	3 8	—	—	—	2	16
			194	3 12	4 4	—	—	11	23
			195‡	4 8	—	—	1	19	23
			196	3 8	4 8	—	2	24	24
			197	4 4	4 12	—	—	13	18
			198	3 12	5 4	—	—	6	15

* Signifies hen was still laying at close of competition.
† Signifies moulted.

continued.

Laid. Feb.	Mar.	April.	May.	June.	July.	Aug.	Total per Hen.	Value per Hen. s. d.	Untrapped Eggs.	Total Eggs from Pen.	Total Value of Eggs from Pen.	No. of times Broody
7	23	20	14	13	11	12	140*	13 8				4
—	—	—	3	14	13	10	69	7 5¼				3
15	23	15	5	11	13	5	174	19 8				—
7	26	23	10	12	20	7	131	11 10½				—
16	24	22	10	19	14	14	146	13 5¾			£ s. d.	3
22	29	23	10	11	13	13	138	12 4		798	3 18 5½	—
20	18	10	13	12	10	—	145	15 2				3
17	22	21	18	11	15	5	137	12 6½				2
18	23	20	23	16	18	20	170*	15 9½				—
19	23	25	19	13	11	18	175*	17 4¾				2
1	2	2	—	—	—	2	7	0 7¾			£ s. d.	—
21	23	20	20	12	10	23	171*	16 8		805	3 18 2½	3
4	23	22	12	4	—	1	97	9 5¼				—
9	24	18	16	13	10	11	142	14 1				—
20	25	23	24	13	16	4	147	12 9¾				—
5	22	19	8	7	2	—	89	8 7				—
15	21	24	22	18	16	19	178*	17 4½			£ s. d.	—
8	22	22	17	8	11	6	140	14 1¼		793	3 16 4¾	—
2	6	4	—	15	19	14	75*	6 11¾				2
18	15	20	12	14	16	18	125*	11 2				—
16	17	12	15	17	18	13	119	10 6	216			1
11	19	8	10	11	—	16	95	8 10½				4
16	13	12	7	11	5	7	92	8 3½			£ s. d.	4
12	8	13	15	13	15	11	102*	9 2½		824	3 15 10	2
19	21	19	13	14	13	12	145	12 11				5
10	7	14	17	11	—	1	92	9 3				5
15	15	15	12	14	4	10	102	9 2¾				7
18	23	22	15	6	14	—	136	12 9¼				3
20	21	16	16	13	12	13	180*	19 5½			£ s. d.	3
19	19	16	16	14	13	6	131*	12 2½		786	3 15 9¾	5
17	21	23	20	11	18	13	160	15 0½				—
8	16	20	17	15	8	4	120	10 8¼				—
15	20	18	19	13	7	8	109	9 1½				—
10	24	22	20	8	20	7	143	13 0¼	15			—
15	21	23	22	18	17	16	147*	12 8¼			£ s. d.	—
5	22	19	10	15	14	15	128*	11 11¼		822	3 14 7	—
21	26	16	17	14	14	16	141*	12 2¼				4
16	22	22	11	6	13	12	141*	14 6¼				3
22	19	24	16	15	—	8	118*	9 10¾				3
18	22	22	18	20	9	18	139*	12 1½				1
23	28	19	18	6	8	12	126	10 4¾			£ s. d.	4
20	22	18	17	6	2	11	146	14 8¾		814	3 13 10¼	5
17	9	17	11	7	20	18	117*	10 1¼				—
10	10	19	1	7	2	—	83	8 4½				1
20	5	24	11	15	8	7	133	12 7	65			3
20	24	11	16	8	9	17	155*	15 5				4
19	19	14	13	11	10	14	131*	12 0¾			£ s. d.	6
8	7	22	16	4	11	15	104	9 5		788	3 13 1¼	3

‡ Original bird died and was replaced.

TABLE A.—

Order of Merit.	No. of Pen.	Breed and Time of Hatching.	No. of Pullet.	Weight. On Arrival lbs. oz.	Weight. At close of Test lbs. oz.	Eggs Oct.	Nov.	Dec.	Jan.
			19	3 8	4 8	—	15	23	19
			20	4 4	4 4	—	—	16	9
25	4	Black Minorca. [March]	21	3 12	4 4	—	—	3	20
			22	3 0	4 8	—	—	9	12
			23	3 0	4 12	—	6	22	18
			24	3 12	4 8	—	3	21	21
			217	3 4	4 4	—	—	17	16
			218	3 0	4 4	—	—	—	14
26	37	White Leghorn. [14th March]	219	3 12	5 4	—	—	3	17
			220	3 8	5 4	—	3	16	16
			221	3 0	4 0	—	—	—	17
			222	3 4	5 0	—	—	12	11
			139	5 0	5 4	5	13	7	—
			140	4 8	5 0	—	—	—	9
27	24	Rhode Island Red. [8th Mar.]	141	4 0	4 12	17	11	2	11
			142	5 0	5 8	—	10	5	—
			143	4 8	5 0	—	—	—	6
			144	4 8	5 0	—	—	5	—
			235	3 0	3 12	—	—	—	15
			236	3 4	4 0	—	2	19	20
28	40	Brown Leghorn. [April]	237	3 12	4 8	—	4	16	5
			238	3 4	4 0	—	—	6	16
			239	4 8	5 4	6	18	18	12
			240	3 8	3 12	—	1	22	19
			127†	4 0	4 8	—	—	—	—
			128†	4 8	5 0	—	—	—	20
29	22	Rhode Island Red. [12th Feb.]	129†	4 4	5 8	14	—	—	4
			130†	4 4	5 4	16	1	—	10
			131†	4 0	5 0	—	—	—	14
			132†	4 4	4 8	—	—	21	21
			43‡	2 12	—	—	—	14	13
			44	3 4	4 8	—	—	—	14
30	8	White Leghorn. [March]	45†	3 4	5 0	—	1	14	19
			46	3 0	4 12	—	—	16	19
			47	4 8	3 0	—	—	16	18
			48	2 12	4 12	—	—	3	12
			187	4 8	5 12	—	18	18	9
			188	4 4	4 8	—	—	18	20
31	32	White Wyandotte. [March]	189	4 0	5 0	—	—	9	7
			190	3 4	4 0	—	—	4	5
			191	4 0	4 8	—	—	12	20
			192	4 0	5 0	—	—	—	11
			121	3 0	3 4	—	—	—	7
			122	3 4	4 12	—	—	—	18
32	21	Rhode Island Red. [9th April]	123	4 0	5 8	—	—	20	14
			124	4 0	6 0	—	—	14	20
			125	3 8	4 12	—	—	19	18
			126	4 8	6 0	—	6	19	20

* Signifies hen was still laying at close of competition.
† Signifies moulted.

continued.

Laid.							Total per Hen	Value per Hen.		Untrapped Eggs.	Total Eggs from Pen.	Total Value of Eggs from Pen.	No. of times Broody
Feb.	Mar.	April.	May.	June.	July.	Aug.		*s.*	*d.*				
18	23	23	15	10	15	4	165	17	2				2
2	21	20	11	10	7	5	101	9	7¼				—
5	16	21	8	11	3	9	96	8	10¾				—
—	19	17	10	3	7	4	81	7	7½				1
15	21	24	18	1	19	11	155	15	9¼			£ *s.* *d.*	—
15	22	22	13	11	8	—	136	13	8½		734	3 12 9	—
9	22	21	22	12	—	—	119	11	2¾				—
17	23	24	19	10	8	12	127	11	1¾				—
1	23	20	20	10	—	—	94	8	1				—
17	18	23	18	19	17	19	166*	16	0¼				—
15	21	22	20	17	18	14	144	12	7½			£ *s.* *d.*	—
1	23	24	19	7	18	17	132	12	0¾		782	3 11 2	—
9	20	20	19	17	13	17	140	13	3				—
20	21	23	27	21	22	22	165*	14	2				—
11	25	22	12	12	8	11	142	13	9½				2
1	22	23	15	12	12	12	112*	10	0				5
20	23	25	9	11	11	—	105	8	9¾			£ *s.* *d.*	3
5	15	23	23	16	20	16	123	10	3½		787	3 10 3½	—
15	12	21	2	9	4	11	89	8	3				—
20	22	22	20	20	17	17	179*	16	1½				—
10	10	18	20	11	3	1	98	9	5¾				—
12	13	15	15	10	—	—	87	8	1¼				—
14	10	20	1	—	—	8	107	12	5½			£ *s.* *d.*	—
18	22	20	18	12	3	18	153	15	5¾		713	3 9 10¾	—
—	22	15	18	10	11	7	83	6	5¾				5
19	21	12	17	11	11	10	121*	11	0¾				4
18	18	14	13	16	12	12	121*	11	0¼				5
18	24	22	16	9	10	12	138	12	10				4
17	20	20	18	17	16	16	138	12	1¼			£ *s.* *d.*	—
20	18	21	18	14	13	11	157	15	5¼		758	3 9 0	4
9	23	22	17	1	7	14	120	11	6½				—
17	21	19	19	13	—	12	115	10	2				—
14	21	19	15	15	14	16	148	14	3¼				—
18	23	23	20	19	12	1	151	14	1				—
15	21	18	5	15	8	1	117	10	7			£ *s.* *d.*	—
11	21	21	11	6	—	—	85	7	6¼		736	3 8 2½	—
1	14	23	20	5	—	—	108	10	11				—
16	19	14	15	12	6	10	130	13	1¼				4
1	15	23	18	17	11	19	120*	10	8¾	109			1
1	5	18	—	—	1	—	34	3	2				—
16	23	8	14	11	1	2	107	10	7¾			£ *s.* *d.*	3
20	21	19	8	14	—	—	93	8	0½		701	3 7 3½	2
13	19	10	18	11	8	8	94	7	10½				3
19	23	21	13	10	8	7	119*	10	5				4
2	13	11	10	7	9	9	95*	9	10¾				6
7	14	17	14	15	13	11	125*	12	1¾				7
5	26	17	16	13	13	9	136	12	9¼			£ *s.* *d.*	6
11	9	15	12	13	9	12	126	13	2¾		695	3 6 4	5

‡ Signifies original bird died and was replaced.

TABLE A.—

Order of Merit	No. of Pen.	Breed and Time of Hatching.	No. of Pullet.	Weight. On Arrival lbs. oz	Weight. At close of Test lbs. oz.	Eggs Oct.	Nov.	Dec.	Jan.
			151	3 8	4 4	—	—	17	18
			152	4 0	5 0	—	6	22	22
33	26	White Wyandotte. [End of February and early March]	153	3 12	4 8	—	9	19	—
			154†	3 8	5 0	—	—	19	18
			155	4 4	5 0	—	—	—	14
			156	3 12	4 4	—	—	—	1
			241	4 12	6 8	3	3	—	—
			242	4 12	5 0	—	—	20	20
34	41	Buff Orpington. [February, March and April]	243	4 8	4 12	—	12	21	18
			244	5 0	—	—	—	8	7
			245	4 4	6 8	—	5	19	18
			246	4 4	5 0	—	—	22	25
			91	3 12	5 0	—	2	21	21
			92	4 8	5 8	4	25	25	27
35	16	Light Sussex. [March]	93	4 12	6 8	—	—	19	13
			94	4 12	6 0	—	—	4	2
			95	5 4	7 0	—	—	5	3
			96	5 8	7 8	8	20	15	17
			97	3 4	5 0	—	—	—	7
			98	3 0	5 12	—	—	—	13
36	17	Rhode Island Red. [April]	99	3 0	4 0	—	3	* 20	2
			100	3 0	3 0	—	—	—	—
			101	4 8	5 4	2	22	25	16
			102	3 4	5 4	—	—	18	19
			49	3 4	4 4	—	—	—	9
			50	3 4	5 0	—	—	—	17
37	9	Brown Leghorn. [April]	51‡	3 12	—	—	—	—	14
			52	3 0	5 0	—	—	19	14
			53	3 4	4 4	—	5	21	—
			54	3 4	4 0	—	—	—	—
			211	5 0	6 0	—	—	13	—
			212†	4 8	6 8	—	—	—	2
38	36	White Wyandotte. [1st Apr.]	213	4 12	5 12	—	—	—	17
			214	4 8	4 12	—	—	2	15
			215	5 0	5 0	—	—	—	—
			216	4 4	5 0	—	—	—	—
			115†	4 4	5 0	17	—	—	6
			116	5 4	4 8	—	—	—	—
39	20	Rhode Island Red. [20th Apr.]§	117	4 0	4 12	—	—	—	5
			118	5 0	6 4	—	—	—	—
			119	5 0	5 8	—	—	—	—
			120	5 4	6 4	—	—	—	12

* Signifies hen was still laying at close of competition.
† Moulted.

continued.

Laid. Feb.	Mar.	April.	May.	June.	July.	Aug.	Total per Hen.	Value per Hen. s. d.	Untrapped Eggs.	Total Eggs from Pen.	Total Value of Eggs from Pen.	No. of times Broody.
16	25	18	11	9	13	8	135*	12 2¾				4
15	22	24	23	13	13	7	167	16 5¾				2
6	19	22	22	17	9	15	138*	12 3¼				—
12	19	20	19	—	1	16	124*	12 7½				—
15	23	20	14	10	1	8	105	9 2¾			£ s. d.	2
—	12	8	7	—	3	7	38	3 2¾		707	3 6 0¾	—
—	18	19	8	12	—	—	63	4 10½				2
8	5	20	20	22	19	21	155*	14 8½				—
10	10	15	14	—	8	4	112	12 5¾				3
—	14	12	—	—	—	—	41	3 8¾				—
14	23	26	14	9	8	11	147	14 8			£ s. d.	4
19	22	17	14	12	11	12	154	15 3¼		672	3 5 8¾	6
11	21	16	10	11	13	13	139	14 1½				5
21	27	26	26	17	17	18	233*	23 9¾				3
7	25	10	17	11	12	7	121*	11 10				4
8	8	9	3	—	2	6	42	4 1½				—
—	1	—	—	—	—	—	9	1 3¼			£ s. d.	—
13	7	—	2	—	—	—	82	9 9½		626	3 5 0	—
17	12	14	11	10	12	8	91	7 11¾				7
10	16	19	11	7	14	12	102*	9 0¾				3
13	21	13	13	13	—	—	98	9 8¾				3
—	11	20	—	—	—	—	31	2 1				—
26	17	20	20	15	10	—	173	17 0½			£ s. d.	4
6	25	25	20	9	21	11	154*	14 8		649	3 0 6¾	2
16	20	15	—	11	5	—	76	6 8½				—
17	21	22	21	7	—	14	119	10 3¼				—
14	17	20	18	11	—	—	94	7 11½				—
8	21	23	18	17	17	13	150	14 1½				—
15	22	22	21	17	6	1	130	12 3½			£ s. d.	1
11	20	19	11	—	—	—	67	4 10¾		630	2 16 3	—
1	11	12	11	22	20	19	109*	9 2¾				—
1	22	24	9	12	14	—	84	6 5½				3
14	21	18	13	9	12	7	111*	9 10	101			2
19	24	18	4	9	7	12	110	10 3¼				4
6	12	14	16	13	17	4	82	6 3			£ s. d.	3
—	22	20	9	9	—	11	71	5 8¼		668	2 15 11¾	1
18	16	16	15	14	11	8	121*	10 11¼				6
—	11	13	10	1	7	1	43	3 3				3
17	22	23	15	7	15	16	120	10 4½	9			3
—	2	16	17	12	7	7	61	4 8				3
—	20	24	24	7	15	19	109	8 10			£ s. d.	2
16	21	16	18	14	5	7	109	9 5½		572	2 8 11½	4

‡ Original bird died and was replaced.
§ Date of hatching cannot have been 20th April in the case of No. 115.

TABLE

Order of Merit	No. of Pen.	Breed, Time of Hatching, and Owner.	No. of Pullet.	Weight. On Arrival lbs. oz.	Weight. At close of Test lbs. oz.	Eggs Oct.	Eggs Nov.	Eggs Dec.	Eggs Jan.
Not Competing.	45	Rhode Island Red. [March] (Munster Institute, Cork.)	265	4 0	4 0	20	18	18	21
			266	4 4	5 0	—	—	5	24
			267	3 12	4 8	12	22	25	22
			268	4 0	4 8	12	20	20	18
			269	4 4	4 8	20	16	23	22
			270	4 4	4 4	—	—	9	20
Not Competing.	47	Rhode Island Red. [March] (Munster Institute, Cork.)	277	4 8	5 8	—	—	24	23
			278	4 4	3 12	—	—	5	22
			279	3 8	4 8	—	—	12	24
			280	4 4	5 0	17	23	25	19
			281	3 8	4 8	3	23	25	24
			282	4 4	4 8	5	20	19	16
Not Competing.	46	Red Sussex. [Feb. & Mar.] (Munster Institute, Cork.)	271	4 4	4 12	19	14	19	15
			272	5 0	5 12	17	6	23	23
			273	5 8	6 0	19	21	9	22
			274	4 8	5 4	19	20	22	19
			275	4 12	5 0	—	—	17	22
			276†	5 0	4 12	19	4	—	13
Not Competing.	50	Rhode Island Red. [March] (Munster Institute, Cork.)	283	—	3 12	—	16	17	8
			284	—	4 8	—	5	21	21
			285	—	4 8	7	19	19	20
			286	—	4 8	20	2	—	19
			287	—	4 8	21	22	21	20
			288	—	4 8	—	3	26	24
Not Competing.	25	Rhode Island Red. [April] (Ulster Dairy School, Cookstown.)	145	4 12	4 12	—	11	24	27
			146‡	5 0	—	25	21	23	22
			147	5 0	5 8	—	—	15	2
			148	4 12	5 8	—	7	24	23
			149	5 0	4 8	17	2	—	7
			150	5 0	5 0	13	3	16	19
Not Competing.	35	White Wyandotte. [March] (Ulster Dairy School, Cookstown.)	205	5 8	5 4	—	—	21	22
			206	5 0	5 8	—	6	22	23
			207	5 0	5 0	7	—	10	24
			208	5 4	5 4	2	20	21	20
			209	4 8	5 4	—	—	—	6
			210	5 0	5 0	—	1	21	25
Not Competing.	44	White Leghorn. [Jan., Feb. and Mar.] (Munster Institute, Cork.)	259‡	2 12	—	5	21	18	20
			260†‡	3 0	—	—	7	19	11
			261†	3 0	3 8	—	6	12	16
			262†	3 4	3 0	—	17	9	15
			263	3 4	3 8	20	15	14	8
			264†	3 4	3 8	—	15	12	10
Not Competing.	43	White Leghorn. [Jan., Feb. and Mar.] (Munster Institute, Cork.)	253	2 12	3 0	2	10	13	9
			254	3 0	3 0	9	5	3	5
			255†	3 0	3 8	—	15	20	9
			256†	3 0	3 8	—	6	15	5
			257†	3 8	4 0	—	8	5	—
			258†	3 0	3 12	2	5	3	2

* Signifies hen was still laying at close of competition.
† Moulted.

B.

Laid.							Total per Hen.	Value per Hen.		Untrapped Eggs.	Total Eggs from Pen.	Total Value of Eggs from Pen.	No. of times Broody.
Feb.	Mar.	April.	May.	June.	July.	Aug.		s.	d.				
16	19	14	18	19	17	17	197*	20	7¾				—
22	28	25	22	15	12	14	167*	14	5½				2
17	24	22	15	14	14	13	200*	21	0¾				2
20	25	24	19	13	14	18	203*	19	11½				3
20	27	25	20	16	15	12	216*	21	6¾			£ s. d.	4
20	25	18	22	15	16	15	160*	14	10¼		1143	5 12 6½	4
20	23	22	18	16	16	20	182*	18	2				—
17	22	23	16	11	13	15	144*	12	1¾				3
19	27	18	20	12	13	8	153*	13	8¾				4
11	24	21	20	13	11	13	197*	20	5½				4
18	25	22	23	22	21	16	222*	22	0			£ s. d.	1
16	19	22	21	19	19	18	194*	19	4½		1092	5 5 10½	1
4	22	21	17	17	13	14	175*	16	9¼				3
15	22	23	20	10	2	—	161	15	8½				—
19	24	24	23	21	22	18	222*	20	7¼				1
18	21	22	20	18	17	16	212*	21	6¾				—
9	24	16	18	11	14	13	144*	13	0			£ s. d.	5
21	11	17	18	16	14	12	145*	12	7¾		1059	5 0 3½	6
10	24	22	25	22	22	16	182	16	4¾				—
11	22	20	10	11	10	8	139*	13	10				3
15	21	23	17	11	5	1	158	16	8¾				—
19	22	21	15	11	12	18	159*	15	5½				3
13	20	19	15	11	10	17	189*	20	0			£ s. d.	3
20	26	21	21	16	20	14	191*	17	1		1018	4 19 6	4
22	26	23	16	13	12	15	189	19	6				2
21	25	17	21	16	18	7	216	22	1½				—
4	24	23	23	24	21	7	143	12	4				—
19	28	19	11	12	11	—	154	15	11				3
16	22	24	17	10	8	16	139	12	10¼			£ s. d.	4
15	17	16	9	1	—	1	110	11	11¼		951	4 14 8	2
18	21	21	13	15	17	15	163*	16	2½				1
23	25	20	16	19	10	—	164	16	3				1
20	24	15	14	13	5	11	143	12	11½				6
17	22	22	12	21	9	19	185*	19	0¼				2
4	24	21	16	16	16	12	115*	9	0¾			£ s. d.	5
19	26	27	23	20	23	21	206*	19	5¾		976	4 12 11½	—
16	26	21	1	4	15	12	159*	17	5				—
6	24	22	11	13	—	8	121	12	0				—
8	21	19	20	18	4	17	141*	13	6	6			—
15	23	20	23	19	24	15	180	17	1				—
12	20	20	21	16	22	19	187*	18	9¾			£ s. d.	—
14	23	18	16	17	—	5	130	12	9½		924	4 12 2½	—
19	17	20	15	18	13	16	152	14	10¼				—
11	17	21	22	6	15	14	128	11	6				—
11	23	24	20	18	16	14	170	16	8¼				—
17	20	21	12	14	—	12	122*	11	11½	138			—
4	18	17	5	—	—	—	57	5	5½			£ s. d.	—
9	16	16	11	15	2	2	83	7	3¾		850	4 6 10¾	—

‡ Original bird died and was replaced.

TABLE C.—SHOWING RETURN FROM SECOND-YEAR AS COMPARED WITH FIRST-YEAR HENS.

No. of Pen.	Eggs Laid.		Value.		Total Value 1st Oct., 1912, to 31st Aug., 1914 *
	1912–13 1st Oct. to 31st Aug.	1913–14 1st Oct. to 31st Aug.	1912–13 1st Oct. to 31st Aug.	1913–14 1st Oct. to 31st Aug.	
			£ s. d.	£ s. d.	£ s. d.
48	1210	731	5 10 11¾	3 10 5½	9 8 9¼
			£ s. d.	£ s. d.	£ s. d.
49	1003	866	4 12 1	4 2 0½	8 18 9½

* Includes value of eggs laid in September, 1913, which figures do not appear in Competition Reports, which cover eleven months only.

CROP REPORT, MID-OCTOBER, 1914.

The weather, during the closing weeks of September as well as during the first weeks of October, was extremely mild, and favoured the completion of all harvesting work. Rarely has there been such a long spell of good weather. In backward districts this enabled the last of the oat crop to be saved in fine order, and permitted the threshing of the general cereal crops to be carried on without any interruption and to advantage in the quality of the straw. Owing to the early and satisfactory character of the harvest, full opportunity was afforded for the sowing of catch crops as well as for the autumn cultivation of stubble land. The raising of the potato crop began at the first week in October and is now general.

The following are the main features regarding the various crops as disclosed by a series of reports supplied through the courtesy of the Department's Crop Correspondents at the middle of October :—

Leinster.

Co. Carlow.

Wheat was saved in good condition and has yielded over average: in some instances a produce of 10 barrels (20 stones) per statute acre has been obtained. Oats is yielding below average and is light in bushel weight. The Barley crop has been practically all threshed; yields were good and the samples bushelled well. Digging of the Potato crop is in full operation; the returns will be somewhat below last season; there is an average proportion of diseased tubers. Turnips are growing well and may turn out a fair crop; Mangels are very good and will give about an average yield. Pasture, owing to the recent mild weather continues growth; there are prospects of abundant pasturage for outlying stores during the coming winter. Forward stores are selling well; the demand for young cattle, 1½-year-olds, is slack. Sheep are bringing exceptionally good prices; there is a brisk trade in horses of all kinds, and prices are tempting farmers to sell off the most useful animals.

Co. Dublin.

Crops of Wheat and Barley have yielded well and the quality of the grain is good. Samples of Oats are very variable and the yield is lower than usual. Potatoes are a satisfactory crop. Turnips will be much below average in yield, but Mangels are very good. Pastures carry a fair covering of grass now; the grazing season on the whole has been, however, disappointing.

Co. Kildare. Wheat was well saved and is threshing out better than was at one time expected; the quality of the grain is excellent; there is a deficiency in the bulk of straw. Oats were damaged somewhat in harvesting; yield and quality are moderate; there are some complaints that the grain filled badly owing to mildew. Barley was well saved and the quality is average; prices are disappointing. Lifting of the Potato crop has begun; the yield is good; Champions have a large proportion of diseased tubers. Turnips have improved wonderfully but will not be up to average; fields are patchy and at present are in need of rain as mildew is showing in some places. Mangels are a good crop and may be over average. A large sowing of catch crops has been made and they are coming up well. Pasture has been better in August and September than at any time during the summer. Cattle are healthy and have thriven well for the past two months; prices are satisfactory.

Co. Kilkenny. Wheat is an average crop and was threshed under good conditions. Oats is below average and weight per bushel under normal; on light land straw was very short. Barley turned out better than expected; there are complaints of smut affection from some districts; the bushel weight is from 53 to 54 lbs. Potatoes are a good average crop; there is some disease showing among those already lifted. Turnips have improved considerably but the yield will be under average. Mangels are a good crop and well above the normal return. Catch crops are promising very well; they would be benefited by some rain. Pastures are full of grass and live stock are doing well; dairy cows are milking much better than at this time last year. Forward store cattle are in good demand though prices are not so high as they were some weeks ago. Store pigs are in very good demand and fetching good prices.

King's Co. Wheat, which was well saved, is nearly all threshed; the crop generally was good. Oats are much below the average in yield: a proportion of the grain was damaged at harvesting time. Barley was an excellent crop; the yield of grain was large and the quality very good. Potatoes are a heavy crop though not up to last year's return either in yield or in quality; there are a great many diseased tubers among Champions, especially where not sprayed. Turnips in general are very inferior and much below the average; even where the crop succeeded, the roots are small; prospects of a root supply for stall-feeding are not good. Mangels will be a heavy crop and good quality. Pastures are extraordinarily green for the season; Cattle are doing well and prices are higher than this time last season.

Co. Longford. Wheat, which is not much grown, is an average crop of both straw and grain. Oats may be up to average yield on well-manured land; on light land the straw is short and the grain, which is good in quality, nearly up to average. Potatoes are expected to be an average crop; there are very few diseased where spraying was done twice; where unsprayed, the proportion of affected tubers is large. With some exceptions fields of Turnips and Mangels are up to average. Pastures are much improved since mid-August and there is a heavy crop of aftergrass especially on meadows cut early. Live stock have done well. Prices are good, especially for fat cattle and sheep. Young pigs are selling better since feeding became more plentiful.

Co. Louth. Wheat has been all harvested but very little threshed; growers are inclined to hold stocks in anticipation of improved prices. The larger proportion of the Oat crop has been threshed and gave an average yield; prices approximated to 13*s.* 6*d.* per barrel (14 stones). A considerable quantity of Barley has been marketed; yields were about average; selling rates were about 15*s.* 6*d.* per barrel (16 stones). Potatoes are a good full crop. Turnips are almost a failure; early sown fields that looked well in places are badly mildewed and decaying; later sown fields may turn out better. Mangels are a satisfactory yield. Pasture is maintaining stock well, and cattle are thriving satisfactorily. Prices for all kinds of stock are encouraging. There has been a good quantity of clover or second-cut hay excellently saved owing to the favourable weather.

Co. Meath. The harvest is practically over; Wheat has turned out very well and the quality of the grain is excellent. Oats are not threshing out so well as last year; in some districts there is a considerable quantity of damaged grain. Barley, which is grown in a few districts of the county gave an average yield of grain. Potatoes are on the whole a plentiful crop and, where spraying was effectively done, the tubers are sound; where spraying was overlooked, the bulk of diseased tubers is large; kidney shaped varieties are stated to be lifting a heavier crop than round; quality is only medium. Turnips are much in need of rain; early sown fields are badly affected by mildew; yield is certain to be much under average. Mangels are a full average crop; some fields are showing signs of heart-rot attack. Catch crops are doing well. Pastures never looked better for the time of the season. All classes of stock have done well and brought good prices. Store cattle are fairly plentiful but sheep are scarcer than usual.

Queen's Co. Wheat has turned out a fairly good crop. Oats are giving only medium yields and the quality of the grain is poor. The yield of Barley is below that of last year. Potatoes are plentiful. Turnips are very moderate; many fields were failures entirely. Mangels are a satisfactory crop. Pasture is excellent for the stage of the season and cattle are in good condition.

Co. Westmeath. Wheat is not much grown; the crop has given a full average yield of good quality grain. Oats is a fair average crop and was all saved in good condition. Barley which is grown only in one district gave an average yield. Potatoes are a good crop and in some districts are yielding better than last season; in unsprayed fields there are many diseased tubers; where this crop was sprayed little damage from disease is noticeable. Turnips are now bulbing fairly well; the yield however will be much below average. Mangels will give a fairly good return in most districts. Rape is making good progress; brairds of winter Vetches and Rye are healthy and vigorous. There is a fair amount of winter keep on the pastures which are looking well; all kinds of stock are fetching good prices.

Co. Wexford. The Wheat crop gave a heavy yield of grain, which was of splendid quality. Spring sown fields of Black Tartary gave very disappointing returns; yields were poor and the quality of the grain inferior; winter sown fields gave excellent returns of plump good quality grain; current prices are from 11*s*. to 12*s*. per barrel (14 stones). The yield of Barley was not quite so heavy as last year, though a fair to good average was obtained; the bushel weight of samples was generally low—52 to 53 lbs. Markets opened at 15*s*. 9*d*. but prices have since fallen to a range of from 14*s*. 3*d*. to 15*s*. per barrel. Potatoes are a splendid crop; tubers are plentiful and of good quality; some varieties are reported as showing signs of disease. Turnips are growing well but late and backward; though the tops are luxuriant bulbs are still very small. Mangels are a fine heavy crop; a great number of fields are however very thin owing to misses. Pastures are green and growing well but grass is rather soft. Live stock are doing well and prices much improved.

Co. Wicklow. Wheat, which is very little grown, is nearly all threshed; there was an average yield of grain and straw. Oats gave a disappointing return of grain and straw and is not up to average; the sample is fairly good. The small area of Barley grown yielded satisfactorily; quality of grain is considered to be good. Potatoes are now being raised and yielding above average; the quantity of diseased tubers

is stated to be small; the eating quality of the crop is not as good as last year. Turnips want rain badly; many fields are mildewed and the crop is not bulbing as well as some weeks ago; owing to misses the yield will be much short. Mangels are a fair crop on the whole. Owing to the favourable weather the fields of rape sown for spring feeding are coming on well. Pastures are good in most districts though rather bare towards the mountains and in need of rain. Stock are healthy, and where grass is good, are thriving better than they did during the summer. Prices, especially for sheep, are very good.

Munster.

Co. Clare.

Wheat, which is little grown, was a very good crop; the grain of the small quantity threshed is plump, hard, and well coloured; the grain on some plots was slightly damaged by rain at harvest time. Oats is yielding well, but a portion of it was badly saved. Barley is little grown; was well saved and the sample of grain is good in colour. Potatoes are a heavy crop and of excellent quality; there is much disease reported in the Champions, which, as a variety, shows signs of deterioration; lifting is in full progress. Turnips have abundance of leaves but bulbing is starting very late; with favourable weather the crop may yet bulk well. Mangels are very good. Cabbages are doing well of late. Pastures have done well since August. Cattle are in good condition; dairy cows are also milking well. Cattle and sheep are making remunerative prices; strong stores are in special demand. Owing to the drain on horses for military purposes, unbroken animals of the agricultural type find ready sale.

Co. Cork.

The small area of Wheat grown has given a satisfactory yield; surplus stocks are fetching a good price for seed; a considerably increased area will be grown next year. The Oat crop has been nearly all threshed; in late ripening districts many fields were damaged in stook owing to unfavourable weather; yield of grain and straw will be below average; very little of the crop has yet been marketed as farmers are inclined to hold stocks; present prices 7*s.* 3*d.* to 7*s.* 6*d.* per cwt. for white oats, and 7*s.* to 7*s.* 3*d.* for black oats. Barley turned out rather unsatisfactorily; though yields were fair much of the grain was damaged in colour; prices are comparatively low, the average being 14*s.* 6*d.* per barrel; a considerable quantity is being held over for pig feeding. More than half the Potato crop has been raised; the yield is above average; from some districts a large proportion of diseased tubers is reported, especially among old Champions. Turnips have grown rapidly for the past six weeks but more inclined to leaves than to bulbs; yield will be under average. Mangels give promise of a splendid crop and yield may be considerably over average.

A considerable area of Rape, Hardy Green Turnips, and Winter Vetches has been sown. Winter Wheat is being sown extensively after potatoes and even on mangel ground. Cabbages are later than usual and not so bulky. Pastures are well-covered ; if mild weather continues, there should be keep for all classes of stock on pastures up to 1st December. Dairy cows are milking well and early calvers are slower in drying off than usual. Prices for all classes of stock are extremely good.

Co. Kerry.

Wheat, where grown, was a fair crop in some places. The Oat crop is yielding well, the grain is not so well coloured as last year. The small area of Barley grown is expected to return a good average yield. Potatoes are everywhere being dug out under favouring weather conditions ; the yield is good except in the case of the old Champion which has given a poor return ; there are complaints from some districts of tubers blackening ; in other districts it is stated the proportion of diseased tubers is less than usual. Turnips are doing fairly well and except where they failed outright a reasonable crop will result ; the crop at present is showing plenty of tops but is not bulbing well. Mangels are good · in many places the crop is very heavy. Cabbages have done wonderfully well of late. Pasture improved much during September and now carries plenty of good grass. Live stock of all descriptions are in good condition ; dairy cows are milking well for the stage of the season. Demand is good and prices satisfactory.

Co. Limerick.

The crop of Wheat straw was shorter than usual but the yield of grain was average ; there were complaints of smut attack in a few cases. Oats was a light crop all round ; straw was light and grain not as plump as usual ; there were some complaints of heating in the stack and discolouration of the grain owing to rain at harvest. Prices for white oats is 1*s.* per stone, for black oats 11*d.* per stone. Barley is giving a medium yield ; much of the crop is only fit for grinding. Potatoes are being dug out in splendid condition ; a large proportion of diseased tubers is reported among the old Champion and Beauty of Bute varieties ; the crop will give about an average yield. Turnips will not be by any means up to average ; fields have grown a heavy crop of leaves latterly but the bulbs are small. Mangels are good ; some of the crop has been already lifted. A very large area of catch crops has been grown in the county and most are doing splendidly. It has been the best late grass season for many years. Store cattle have improved much in condition ; milch cows are still giving a good supply of milk. Prices for beef and mutton are good ; there is also a keen demand for bulls and aged cows. Pigs have dropped a little in price of late.

Co. Tipperary. Wheat has threshed out well with good yields of grain and straw ; only a small quantity as yet has been offered for sale; current price is £1 per barrel. Oats were saved well in general but some fields were somewhat injured by the rain in mid-September; price in local market is 11*s*. 6*d*. per barrel (14 stones). Threshing of the Barley crop is in progress; grain is sound and good ; price is disappointing—14s. 6*d*. per barrel (16 stones) ; as a consequence much of the crop is being held for feeding purposes. Potatoes are just being raised ; yield is above average ; there is a large proportion of diseased tubers in unsprayed fields. Turnips are showing plenty of tops ; bulbs are however small and the crop will be much below average. Mangels are a very fair crop generally, and are now being lifted. Cabbages are a poor crop in some districts. Pastures are fresh and good but would be benefited by rain. Cattle and Sheep are doing very well and prices are high ; Dairy cows are milking well though the supply was short during the Summer months. Horses of all kinds are in keen demand ; Milch Cows are fetching good prices.

Co. Waterford. Wheat is not grown to any extent. Oats are nearly all threshed ; produce was fair ; samples were good but there was a great amount of soft grain which would require loft-drying to prevent heating; local price is 11*s*. 3*d*. per barrel. Barley was an average yield of medium quality grain ; price was not good—14*s*. 6*d*. per barrel. Lifting of the potato crop is being proceeded with ; yield is well over average and tubers of good quality ; in some districts there is a high proportion of diseased tubers especially in the old Champion and some second early varieties. The turnip crop is very patchy and greatly under average ; fields have improved much recently. Mangels are very good and will be over average ; the crop is being lifted and stored under excellent conditions. Pastures are very fresh and showing unusual autumn growth. Live stock have done exceptionally well for the past two months, and prices have been higher than for twenty years. Milch cows are maintaining Summer condition and milking well. Pigs are plentiful ; large numbers have been sold as stores in recent markets and in consequence young pigs are comparatively cheap.

Ulster.

Co. Antrim. Wheat, though very little grown, was generally a good average crop and secured in good condition. Oats was a fair crop and well saved ; straw is short. Beans (in the Larne district) turned out a fairly good crop. Digging of the Potato crop is fairly general but some varieties are still too green ; the yield will be rather smaller than last year ;

in most districts the proportion of diseased tubers is stated to be small. Turnips are under average though making good growth at present; early sown fields are suffering from mildew. Mangels are an excellent crop but not largely grown. Flax is generally short in straw; the crop is yielding poorly though some fair returns have been reported; prices are high. Pastures have improved much but require rain. Dairy cows are keeping up milk supplies well; in some cases extra feeding is being given. Store cattle and Sheep were high in price last month; demand has fallen off somewhat recently. Young pigs are meeting with slow demand owing to the fear of an increase in the price of feeding.

Co. Armagh.

The Oat crop was all harvested in good order. Reports from districts where threshing has begun are favourable and yields are good. Digging of the Potato crop is beginning; the crop is good but does not approach last year's return in bulk or in quality; some fields are showing a fair percentage of diseased tubers. Turnips will not be a big crop and at present fields need rain. Only a small quantity of Flax has been scutched as yet; the crop was light on foot and is not yielding well in the mill to the bulk of straw; prices at opening markets are good but supply will fall far short of former years. Pastures are now rather bare owing to want of rain and the water supply is generally very low. Live stock are healthy and selling well.

Co. Cavan.

The small plots of Wheat sown did well and produced over average at the mill. Oats were all harvested in good order; where threshing has been done yields are excellent. Potatoes in some districts are an over average crop; in other districts yields are stated to be disappointing, especially on heavy clay soils; on such soils and where unsprayed there is a large percentage of diseased tubers reported. Turnips are a rather indifferent crop in many districts, but are doing well of late. Mangels are fair. Cabbages are somewhat disappointing. Flax is a fair yield. Pastures are doing well and showing good growth at present. Live stock are thriving satisfactorily, and Dairy cows milking freely.

Co. Donegal.

Oats though not so heavy a crop as last year were well saved and are yielding well; price is good and ranging from 10½*d.* to 11*d.* per stone in local markets. Potatoes are a good crop all over; raising has begun in the earlier districts; where spraying was attended to the quantity of diseased tubers is small. Turnips, if the weather continues favourable, are expected to be a good average crop. Mangels, where sown late, are fair; "bolting" is noticeable in some fields. Flax has been well saved but owing to a shorter growth the yield is less than last year; prices for the lots that have been scutched are very

encouraging. Cattle, when well grazed, are fetching good prices, especially strong forward stores and fat cattle ; there is a good demand for milch cows and springing heifers. Pigs are selling well ; market price stands about 60*s*. per cwt. (dead weight). Young pigs from 8 to 10 weeks old in some parts of the county are selling from 22*s*. 6*d*. to 30*s*. each.

Co. Down.

Wheat was well saved and threshing satisfactorily. There will be a larger sowing of this crop next season and the demand for seed is good. Oats is a fair crop on the average ; yields are good in districts where the soil is cool ; the early harvest was not so favourable as the late ; fields are now all cleared and threshing is proceeding on many farms; Barley is a fair crop and was mostly well harvested. Potatoes are an extra good crop where effectively sprayed ; where unsprayed there is a large percentage diseased ; the crop on an average will not be so good as last year. About half of the Turnip crop looks well ; the other half owing to drought is stunted by mildew and has stopped growing. Mangels are generally good. The Flax crop bulked very small and is yielding very poorly. Pasture is very poor owing to the long drought. Cattle suffered in condition from scarcity of water. Sheep are selling well and there is a large increase in the numbers of breeding ewes purchased this autumn.

Co. Fermanagh.

Wheat is only very little grown ; yield may be about average. Oats is a good crop and rather over average in yield. Digging of the Potato crop has commenced ; there are complaints that a large proportion of the tubers are diseased, but owing to the very heavy yield, the return of sound tubers will probably be over the average. Turnips are now doing wonderfully well and may be an average crop. Mangels are variable ; in some places the crop is the best for a number of years past. The season has been very favourable for getting in catch crops and brairds of these are looking strong and healthy. Scutching of the Flax crop has begun ; yields are stated to be low as compared with the bulk and appearance of the crop. Pasture has given good results of late ; cattle are turning out in good condition ; fairs are somewhat smaller recently.

Co. Londonderry.

Wheat was saved in good condition ; yields are hardly up to last year. Oats is shorter in straw by nearly one-third ; the crop was saved in fine order and where threshing has been done, the weight of grain is well up to average ; Oats on lea have done best. Beans have turned out a good crop with an average bulk of straw and pods. Potato digging is in full swing ; the crop is on the whole satisfactory though there is a high percentage of diseased tubers where spraying was neglected. Turnips have improved much of late, and if early frosts

do not interfere with their growth, may yet approach a full crop; fields look healthy and there is no appearance of mildew. Mangels will come out a full crop. Cabbages are fair. Owing to want of water very little of the Flax crop has been scutched; so far, yields are fair and prices are good; early sowings appear to have done best. Pastures are well improved. Live stock have thriven well for the past month and prices are higher than they have been during the Summer.

Co. Monaghan. Wheat is not much grown; straw is hardly up to average bulk; the grain is of good quality and was all well saved. Oats bulked better than was expected; the return of straw is lighter than last year; yield of grain will be average; little threshing has been done as yet. The Potato crop yield will be above average; digging is in progress; there are very few reports of damaged tubers. There are some very good fields of turnips but the greater portion are poor and patchy; average yield will be far below last year. Mangels are medium to average. The yield of Flax is below average; scutching is in progress and good prices are anticipated. Pasture is holding out well and cattle are healthy and in good condition. Demand for all classes of live stock is good but prices are not so high as they were last month. Young pigs are in fairly good supply, prices ranging from 25*s*. to 30*s*. each. Pork is selling at from 55*s*. to 58*s*. per cwt.—a drop of 3*s*. to 4*s*. per cwt. within a fortnight.

Co. Tyrone. Any Wheat grown turned out good. Oats was a fair crop on strong land but light on sandy soil; yields are good in proportion to the amount of straw which is light. Potatoes will not generally yield as much as last year's crop; digging has commenced; there are some complaints of diseased potatoes especially in Up-to-dates. Turnips have grown very strong tops and if early frosts keep off may bulk out an average crop yet. Flax is selling well, but yields are low. Pastures in some districts are greatly burned up and need rain; in other districts grass is plentiful and cattle are still going forward without any other feed. Live stock, especially good strong stores in forward condition, are selling well at local fairs. Fat cattle are making a good price; springers are scarce and dear.

Connacht.

Co. Galway. The small amount of winter Wheat grown was a good average crop; spring sown wheat was not quite so good; all over, the yield of grain and straw is below average; only a small quantity has yet been threshed. The yield of oats is slightly under average especially on light land; practically all the crops have been threshed; price up to

15*s*. per barrel. The yield of Barley where grown is under average; the quality of the grain is good. Rye which is not much grown is a fair average yield of grain and straw. The yield of Potatoes is unusually large; raising is being carried out in every district under fine conditions for storing; disease is reported from a few districts; quality is only medium. Turnips have done well for the past six weeks, yet the crop will scarcely be average; mildew attack has been more prevalent than usual this year. Mangels are being lifted and show a very fair yield. Where Rape and Green Turnips have been sown for catch crops they are doing exceedingly well. Pasture is unusually good and more luxuriant now than any time during the past Summer. Live stock, especially store cattle, are more plentiful than in previous years and are realizing good prices. The demand for sheep is good and ewes are 6*s*. to 10*s*. dearer than last year.

Co. Leitrim. Wheat was a good crop but there is very little grown. The Oat crop was well harvested; yields are rather light; the quality of straw and grain is very good; some fields were slightly damaged by September rains. Rye is not so much grown as in previous years; this season it is a good crop and was well harvested. The Potato crop is not so heavy as was expected; the Champion variety in particular is greatly damaged by disease; other varieties, such as Irish Queen, are comparatively sound and digging out a good crop. Turnips are patchy and under average; in some districts not much affected by drought the yield may be fair. Mangels are good and growing well especially in bog lands. Cabbages are average. Pastures are finishing up well. Store and beef cattle are fetching high prices—£2 to £3 per head over last year's rates. There is a plentiful supply of pork; recent prices range from 57*s*. to 60*s*. per cwt. (dead weight).

Co. Mayo. All the grain crops were harvested and stacked under favourable weather conditions. An all round shortage in the bulk of straw is to some extent made up for by the excellence of the quality; the yield of grain is satisfactory as regards quantity and also as regards quality, judging from the small lots already threshed. Rye is an excellent crop; it is generally sown on moor, consequently the dry season rather favoured its growth. Potatoes are now being raised and are returning a heavy yield with the exception of the old Champion of which a considerable amount is diseased, especially on worn-out land. Turnips are somewhat below average, though an occasional good yield is to be seen; those sown at the third week of May have done best. Mangels are up to the average, taken all over; the crop pulled up well in the back-end of the season. The few lots of Flax already scutched in the Ballina district have yielded remarkably well according to the straw. Pastures have done well since August and are now carrying a good covering of grass. Live stock have thriven splendidly for the

past two months. Cattle are fully £2 per head dearer than they have been for many years. There is a keen demand for breeding ewes, especially hogget ewes ; owing to the shortage of white-faced ewes cast mountain ewes are fetching from 26*s*. to 28*s*.—or an advance of from 12*s*. to 14*s*. per head over ordinary rates. Young pigs are also very dear and reaching as high as £3 10*s*. per pair. Water is scarce in many places as there has been very little rain since April.

Co. Roscommon.

The small area of wheat grown was harvested in good condition and will give a good return ; preparations for sowing winter wheat are now being made and the area under the crop will be larger next year. Oats turned out a rather light crop ; the grain is of good quality, as is also the straw, though short in bulk. The small patches of Rye grown in bog lands were well saved. The Potato crop is fairly good but not up to last year's return ; on some soils there is a large proportion of small and diseased tubers especially in Champions ; Up-to-date and Irish Queen varieties are in general very good and the quality splendid. Turnips have improved rapidly for the last few months and will be much better than was expected. The Mangel crop is good ; there appears to be less sown than in other years. Cabbages are not so good as usual. Since July there has been a good quantity of Rape sown, and it has done well ; Vetches, hardy greens and Rye sown for the last month are showing strong vigorous brairds. Pastures are well covered though the grass may be too succulent to withstand the first night frosts. Live stock are healthy and bringing good prices ; there has been a great drain on horses available for army purposes ; it is likely as a consequence that young unbroken horses will be put to work at an earlier age than usual. Dairy cows are beginning to get out of milk. Most good store cattle are now sold owing to recent tempting prices. and there has also been a heavy export of good strong heifers suitable for breeding purposes. The number of brood sows being kept appears to be on the increase.

Co. Sligo.

Oats is a fair crop and was well saved. Rye, which is sown in small plots, has given satisfactory yields. The Potato crop is above average and the tubers are of excellent quality ; no reports of disease have as yet been made. The prospect of the Turnip crop varies with the type of soil and the time of sowing ; at present many fields show signs of mildew owing to the dry weather. Mangels are good. Cabbages are a fair crop and there has been less damage from catterpillar attack than usual. Pasture and aftergrass made an extraordinary growth during the last month and in consequence cattle are healthy and putting on condition rapidly. There are good prices for all kinds of stock at local fairs ; sheep and lambs are scarce and in keen demand at advanced rates.

FRUIT CROP REPORT, MID-OCTOBER, 1914.

In continuation of the Fruit Crop Report, Mid-July, 1914, the following summaries of the reports obtained through the courtesy of a number of Fruit Crop correspondents in the various counties, show the conditions and prospect of the tree fruit crops at the middle of October. At Mid-July the prospects of some of the tree fruit-crops were not promising. The frosts of the 23rd and 24th of May had done much damage in the low-lying districts. From Mid-July the season was in general dry, but correspondents consider that there was sufficient rain for the crop unless, perhaps, in old grass orchards. In September and October there was abundance of sunshine and warmth which favoured a full development and nice colouring of the fruit. Apple and Pear scab were not much in evidence, and in consequence these fruits are clean-skinned and well formed. As a result the quality of all tree fruits is much above that of previous years.

On the 14th September a violent gale of wind blew down large quantities of the earlier and many of the late varieties of apples and pears. This caused the market to be glutted with windfalls, and had a very depressing effect on prices. Owing to the heavy crop and advanced price of sugar, all varieties of cooking fruits are a glut on the market and prices are low. Some growers are feeding the cooking varieties of apples to live stock, and in many districts the Damson crop has not been picked off the trees.

Leinster.

Co. Carlow.

Apples were an excellent crop, large and well coloured. Pears were also a good crop. Plums were heavier than for years, and had to be thinned in many cases to allow the fruit to swell properly. Damsons were a splendid crop. Insect and fungoid attacks were not prevalent with the exception of some apple scab and mildew. A fair local demand exists for fruit. Prices : 1*s*. to 3*s*. per 120 for apples ; pears fetch 6*d*. to 1*s*. 6*d*. per dozen, and plums 3*d*. to 6*d*. per dozen.

Co. Dublin.

Apples have bulked better than was anticipated earlier in the season. Pears were a very fair crop. Plums and damsons have yielded well, unless in exposed situations. Fungoid diseases were not prevalent. Market facilities are fair, but prices for all classes of fruit are bad.

Co. Kildare.

Apples finished up well, and such varieties as Bramley Seedling, Newton Wonder, and Lane's Prince Albert, are still on the trees and have coloured well. The crop throughout the county is generally light. Pears on walls bore a heavy crop of high quality fruit. On bush and

standards the yield was fair and well finished. Plums were a good crop on walls but below medium in the open. Damsons on the whole were a good crop. Apples and pears are very clean and free from spot. Plum and Damson trees suffered much from aphis. Most of the apples and pears are sold locally and fetch from 6*d.* to 1*s.* per dozen for apples, and 10*d.* to 1*s.* 3*d.* per dozen according to quality and size for pears.

Co. Kilkenny.

All the leading varieties of apple trees have borne a plentiful crop of well-developed fruit, except Lane's Prince Albert and Worcester Pearmain, which were affected by the late frosts in May. Pears are from average to heavy in most districts, and the fruit is cleaner than in most years. Plums yielded well, especially Victorias. Damsons, although not much grown, were a heavy crop, and quality was good. Crab apples are a plentiful crop. The caterpillar of the gooseberry sawfly was the most troublesome insect pest this season. Prices have been very poor up till a week ago. There was practically no market for small early cooking apples. Prices : first grade cooking apples, 10*d.* to 1*s.* 10*d.* per stone ; dessert apples, 1*s.* 6*d.* to 2*s.* 6*d.* per stone ; pears, 2*s.* to 3*s.* per stone ; plums, 3*s.* per stone ; damsons, 2*s.* per stone.

King's Co.

Apples are an average to good crop. Pears have borne fairly well ; plums and damsons were slightly under average. The tree fruit crop was best in sheltered positions. Where orchards were exposed, the many frosts did much damage. Aphis and red spider did much harm this season. All fruits are generally of average size and well coloured. The marketing of fruit is generally local. Prices : apples, both early and mid-season, fetched 6*s.* to 8*s.* per cwt. ; pears, 6*s.* to 10*s.* per cwt. ; plums and damsons, 3*d.* per lb.

Co. Longford.

The crop on old apple trees was good, but from bad to fair on young trees. The fruit are, in general, well-coloured. Pears yielded a very good crop, and ripened out well. Plums were medium to fair. Damsons bore an excellent crop of fruit. Canker on apple trees has not been so prevalent as during past seasons. The marketing of fruit is local, and prices obtained are only medium.

Co. Louth.

Apples were a very good crop. Pears, where grown against walls yielded well, but not so good in the open. Plums yielded an excellent crop, particularly Victorias and Pond's Seedling. Damsons were a very heavy crop. The caterpillars of the winter and ermine moth did some injury. American gooseberry mildew was the most troublesome

of the fungoid pests. Practically all the early apples are marketed locally and prices are low. Grenadier, Warner's King, and Lord Derby are selling at 6*s.* to 10*s.* per barrel. Damsons fetch 3*s.* to 5*s.* per cwt.

Co. Meath. Apples have yielded well. Pears a good average crop. Plums very good. Damsons an extra heavy yield. Crab-apples are plentiful. All tree fruit ripened early and were harvested in good condition. Canker and blackspot are the worst fungoid diseases. Dublin and Belfast are the chief market towns, and prices on an average are as follows:—Apples, 10*s.* per barrel; pears, 3*s.* 6*d.* to 4*s.* per bushel; plums, 4*s.* per bushel, and damsons, 3*s.* per bushel.

Queen's Co. Apples are an average crop. Many of the young trees suffered from the frosts in May. Pears are a medium crop of small but well finished fruit. Plums were generally a good crop, the late varieties did best. Damsons yielded a full crop of well finished fruit. Leaf eating caterpillars and aphides of all kinds were destructive. Fruit is generally sold locally. Good apples average in price from 2*s.* to 4*s.* per 120.

Co. Westmeath. Contrary to expectation the return from apple trees was over the average, and the large size of the fruit when finished was particularly noticeable. Pears were a very good crop. Plums have yielded well except in low-lying districts. Damsons were a heavy crop especially on old established trees. Insect and fungoid attacks were not so prevalent as during other seasons. There is a good local demand in most parts of the county for fruit, and select apples fetched 9*d.* to 1*s.* per dozen; plums sold at 3½*d.* to 5*d.* per lb., and damsons at 2*s.* 6*d.* per basket of 10 lbs.

Co. Wexford. Apples have borne the heaviest crop for a number of years. Some varieties of pears, such as Pitmaston Duchess, Clapp's Favourite, and Fertility, carried heavy crops of fruit, but other varieties did not yield so well. Plums and damsons were variable, a failure in some parts, and in others fair to good. Insect pests did little damage to fruit trees this season. Apple scab is attacking some of the varieties such as Bismarck and Allington Pippin. Most of the fruit up to the present has been marketed locally and the demand for apples is dull. Dessert varieties fetch from 3*s.* to 4*s.* 6*d.* per hundred, and cooking varieties 2*s.* to 4*s.* per hundred, and in some cases 5*s.* to 6*s.* per hundred have been obtained for first class fruit.

Apples have yielded a very fair crop. Pears very good and well finished. Plums and damsons were average to very good. The most troublesome insect pests were the caterpillars of the magpie and codlin moths. On old apple trees canker is fairly prevalent. Brown spot has affected some apples, whilst American gooseberry mildew is still found in a few districts.

Co. Wicklow.

Munster.

Apples are a very good crop, much above the average in size and quality. Pears have yielded well both on young and old trees. Plums are in general a good crop, and the quality of the fruit is excellent. Damsons where grown have cropped well. Apple scab did some damage especially on unsprayed trees. Canker on apple trees was not so prevalent as in other seasons. Most of the fruit is disposed of locally. Good samples of eating apples realise 4*d.* to 8*d.* per dozen; pears, 6*d.* to 10*d.*, and for very good quality, 1*s.* 6*d.* per dozen. Plums fetched 3*d.* per lb.

Co. Clare.

Apples have produced a very heavy crop, especially such varieties as Bramley Seedling, Lane's Prince Albert, and Lord Grosvenor. Pears, a good crop, but are reported in some parts to be deficient in flavour. Plums, fair to over average, according to locality. Damsons a good crop in some districts and poor in others. Fungoid and insect pests were not so prevalent as in other years, though some damage was done to the apple crop by American blight and black scab. Prices for fruit are bad and the demand limited. Good samples of the early varieties of apples sold locally at 9*d.* per stone. Worcester Pearmains fetched 2*s.* per stone for graded fruit.

Co. Cork.

Apples are a very good crop of large and well-coloured fruit. Pears have yielded well this season, especially in the open. Plums and damsons, not much grown, are a fair average crop, particularly on young trees. The demand for fruit is chiefly local, and the prices are not so good as last year. Early varieties of apples fetched 8*d.* to 9*d.* per stone, whilst the mid-season varieties are selling at from 3*s.* 6*d.* to 5*s.* per 100.

Co. Kerry.

Apples a good crop and ripening well. The heaviest croppers are Bramley Seedling, Lane's Prince Albert, Bismarck, and Worcester Pearmain. Pears have yielded a fair crop of good average sized fruit. Plums a medium crop; the Victoria variety did well in most districts. Black spot is the worst of the fungoid pests this season.

Co. Limerick.

The first quality fruit is marketed in Dublin, and the other grades are sold locally. First grade apples fetch 12*s.* to 16*s.* per barrel, and other qualities 4*s.* to 5*s.* per 120.

Co. Tipperary. The apple crop finished very well, even in exposed places. Pears were a very good crop and the fruit was large, clean, and well formed. Plums yielded well, more especially in sheltered positions. Damsons are a good crop but not much grown. Apple scab is not so prevalent this season. The Winter moth caterpillar was troublesome. In old orchards American blight is often noticed. Practically all good fruit is sold locally, and prices are poor.

Co. Waterford. Apples are yielding well, and the quality and colour of the fruit is excellent. Pears, a good crop with the exception of one or two varieties, the quality and size is good. Plums of the Victoria and Early Rivers varieties carried very heavy crops; other varieties gave a fair yield. Damsons a very good crop where grown. Fruit trees are very free from insect attacks with the exception of green fly. Black scab and canker on apples are the worst fungoid pests. Most of the fruit is being sent to the Dublin markets. The early dessert varieties at the commencement of the season realised 8*s.* to 12*s.* per half-bushel box, but later the price fell to 2*s.* to 4*s.* Cooking apples fetched on an average 8*s.* per barrel. Apples for cider are realising £2 per ton.

Ulster.

Co. Antrim. Apples are a very good crop, except in low-lying situations. Pears have yielded well this season. Plums were average to good. Damsons bore heavily and the fruit was of good quality. Apple scab was not so prevalent this year, and in consequence the fruit is clean skinned and well developed. Markets have been glutted with fruit and the prices are low. Good apples of the Grenadier variety have sold as low as 4*s.* 6*d.* per barrel in Belfast. Damsons fetched 5*s.* per cwt. for best quality.

Co. Armagh. Apples are a good average crop on high situations, but light in low-lying districts. The fruit are large, clean, and well-coloured. Pears were a heavy crop; the common sorts yielded above average. Plums yielded well this season; damsons a heavy crop. Apple scab, canker, and brown rot are the most troublesome fungoid diseases—but on the whole they were not much in evidence this year. The local price for first grade apples of the Bramley Seedling and Lord Derby varieties is 5*s.* per cwt., and for boilers the price is 1*s.* 6*d.* to 2*s.* per cwt. The prices realised in Dublin and Belfast for first and

second grade windfalls are from 3*s*. to 6*s*. net per barrel of 9 stones. The local price of plums is 5*s*. to 8*s*. per cwt., and damsons, 2*s*. 6*d*. to 5*s*. per cwt. Owing to the small prices obtainable much of the damson crop was not picked off the trees.

Co. Cavan.

Apples are a very fine crop especially in sheltered orchards. The dessert varieties have ripened to perfection this season. Pears, not much grown, have yielded an excellent crop of well finished fruit. Plums were very good and ripened early. Damsons, where grown, have yielded well. The season was fine and insect pests not troublesome. Prices are bad with very little demand, and the market is glutted with windfalls.

Co. Donegal.

Apples yielded well where the trees were in dry, sheltered positions. The fruit finished up better than usual. Pears gave a fair yield of average fruit. Plums were a fairly abundant crop in most districts. Damsons, not much grown, were a good crop. Insect pests were not troublesome on the trees. Canker on apple trees is the chief fungoid pest. The demand for fruit is chiefly local, and the prices are poor.

Co. Down.

Apples have turned out a much better crop than was anticipated earlier in the season. In low-lying orchards the crop was a failure. Bramley Seedling especially yielded well, the fruit being of good size, clean and well coloured. Pears are above average in yield and the quality is splendid. Plums, a good crop, especially Victorias. Damsons, a heavy crop. Aphis was the only troublesome insect pest. Fungoid diseases were not prevalent. Prices are much below average. Apples are usually sold in barrels of 9 to 10 stones in the Belfast markets, and are fetching 12*s*. per barrel for first quality fruit, 8*s*. for second quality, and 5*s*. for inferior. The apples sent to jam factories realise 1*s*. to 1*s*. 6*d*. per cwt. Pears are selling at 1*s*. 6*d*. to 5*s*. per stone, and plums of the Victoria variety, realised 12*s*. to 20*s*. per cwt. Damsons fetch from 3*s*. to 8*s*. per cwt.

Co. Fermanagh.

Apples are very good in moderately high or well-sheltered positions. Pears have done well on walls, but are under average in the open. Plums are good in quality but one-third under average in quantity. Damsons are about one-half an average crop; a fair crop in some parts, and scarcely any fruit in others. The caterpillars of the hawk moth were more common than usual towards the end of August. Apple and pear scab were not so troublesome as usual. Some good samples of early cooking apples realised 7*s*. to 8*s*. per barrel early in September. Windfalls for boiling were sold at 1*s*. 6*d*. per cwt.

Co. Londonderry. Apples are a very heavy crop of large-sized, clean, and well coloured fruit. Pears have yielded well where grown against walls, but poor in the open. Plums and damsons, a very heavy crop of well finished fruit. Apple scab not prevalent this season. Apples are chiefly sold in Portrush, Belfast, and Glasgow. The early varieties fetched good prices, but the cooking varieties are only realising 5*s*. to 8*s*. per cwt.

Co. Monaghan. The apple crop is above average in the south of the county, but there is only half a crop in the northern portion. Pears are about average and not much grown. Plums are under average. Damsons were an average crop. In many cases the fruit was not picked owing to low prices. As regards insect attacks, the Winter moth gave most trouble. Apple sucker was not so prevalent as usual. Canker and apple scab are the most common fungoid pests. Marketing is carried out by the larger growers through the medium of the Ulster Fruit Growers' Association. A fairly good local trade is also done in fruit. Prices are low, early cooking apples realised 5*s*. 6*d*. to 9*s*. per barrel; cooking plums sold at 9*s*. per cwt., and damsons fetch 3*s*. per cwt. Late varieties of apples are not yet being marketed.

Co. Tyrone. The apple crop turned out much better than was anticipated. In some parts an average crop of clean, well finished fruit has been grown, whilst in others the crop is thin on the trees but the fruit is good. Pears yielded a very good crop, especially where grown on walls. Plums are variable, in some districts the fruit was abundant on the trees, whilst in others only that part of the crop grown on walls yielded well. Damsons were a very good crop. Fungoid diseases caused little damage this year. Prices are low, apples fetching 3*s*. to 8*s*. per cwt. in Strabane. Pears realise 4*s*. to 10*s*. per cwt. according to quality. Plums sold at from 4*s*. to 10*s*. per cwt., and damsons 4*s*. to 6*s*. per cwt.

Connacht.

Co. Galway. Apples were a good crop, except in a few low-lying districts in the east of the county. The fruit is large, clean, and well finished. Pears are an excellent crop of nice clean fruit. Plums are average, the Victoria variety yielded best. Damsons, not much grown, are plentiful in some districts and fair in others. Insect and fungoid pests have not been troublesome. Fruit is generally disposed of locally; apples fetch 1*s*. to 1*s*. 6*d*. and 2*s* per stone, and pears 1*s*. 6*d*. to 2*s*. per stone.

Co. Leitrim. Apples have finished a nice crop as regards size and quality. Pears are a very fine crop of good size and well finished. Plums did not colour well, and were deficient in flavour. Insect and fungoid pests were not troublesome. Practically all the fruit is consumed by the grower.

Co. Mayo. All varieties of apple trees bore a heavy crop this season. Pears, both late and early varieties, were an average to good crop. Plums were average in some districts; in others the yield was very heavy. Damsons were not so abundant as usual. There was not much injury done by insect pests with the exception of some American Blight attacks. Canker on apple trees was the chief fungoid pest. The demand for fruit is chiefly local. Early dessert apples fetched 2*s.* per stone in the Westport district, and cooking apples now realise 1*s.* per stone.

Co. Roscommon. Apples are a good crop. Fruit is large, particularly Bramley's Seedling, and comparatively clean, even in old orchards. Pears have yielded well, but the fruit is not so large as in other years. Plums gave a good return but are not much grown. Insect and fungoid pests were not destructive. The demand for fruit is local. Apples are cheap, prices averaging from 1*s.* to 1*s.* 4*d.* per stone for best quality fruit. Plums realise 8*d.* to 10*d.* per lb. for choice qualities, and 3*s.* 6*d.* per stone for ordinary grades. Pears fetch 2*s.* per dozen for first quality, and 8*d.* to 1*s.* 3*d.* per dozen for medium classes.

Co. Sligo. Apples are a good crop and of excellent quality, particularly near the sea coast. Pears are an average crop and finished well. Plums a good crop on the whole, but not much grown. Damsons, where grown, have yielded well. Insect and fungoid pests were not nearly so bad as in other years, and did practically no damage. Marketing is done locally. Best quality apples fetch 1*s.* 6*d.* per stone, and old orchard fruit 1*s.* to 2*s.* per 120. Pears sell at 1*s.* 6*d.* to 2*s.* per dozen, and plums realise 3*d.* to 6*d.* per lb. Prices during August were bad, but have lately improved.

THE WARBLE-FLIES.

FOURTH REPORT ON EXPERIMENTS AND OBSERVATIONS AS TO LIFE-HISTORY AND TREATMENT.

I.

NEW FACTS IN THE LIFE-HISTORY.

By PROF. GEORGE H. CARPENTER, M.Sc. ; THOMAS R. HEWITT, A.R.C.Sc.I. ; AND T. KERRY REDDIN, M.R.C.V.S.

The results, up to the summer of 1910, of the enquiry into the life-history of the Warble-flies and the best means for destroying their maggots, have been published in three reports which appeared in the Department's JOURNAL (Vol. VIII., 1908, pp. 227-246; Vol. IX., 1909, pp. 465-476; Vol. X., 1910, pp. 642-650). The present report gives an account of further observations and experiments up to the summer of 1914. During the last two seasons the work has been carried on with increased activity, due to the provision of additional helpers. The problem of the Warble-flies is being, at the same time, vigorously attacked in other countries—France, Belgium, Denmark, Germany, Canada. Attention may be especially called to the work of Dr. Hans Gläser* and Dr. Seymour Hadwen,† who have in several particulars arrived at the same results as ourselves. They have demonstrated, for example, the fact that the eggs are hatched while attached to the hairs of the cattle, and Gläser—like ourselves—studied last year the structure of the minute, spiny, first-stage larva previously unknown outside the egg. Of the various results now set forth the most important is the fact, indicated both by the muzzling experiments and by direct observation, that this first-stage maggot bores into the host-animal directly through the skin, as was generally believed to be the case until the discovery of second-stage larvæ in the gullet led to the view, widely held recently, that the mode of entrance is by way of the mouth. As in former years, most of the work has been carried on at the Department's Agricultural Station at Ballyhaise, Co. Cavan. But some valuable observations have also been made at the Athenry Agricultural Station in Co. Galway, where there are many cattle and where warble-flies abound.

* *Mitteilungen des Ausschusses zur Bekämpfung der Dasselplage.* Nr. 3–6. Berlin, 1912–14.

† Department of Agriculture, Canada (Health of Animals Branch) Bulletin 16. Ottawa, 1912.

Identification of Species. During the last two springs at Ballyhaise as the warble-maggots were extracted they were carefully examined and the species determined as far as possible. The warbles were extracted at two different counts, taken in April and May at dates dependent upon the time of "ripening." The following tables give the numbers of the fourth-stage maggots of each species at the different counts. In the third larval stage the species cannot be determined, as both *Hypoderma bovis* and *H. lineatum* are then apparently alike, though the armature of the cuticle differs distinctly from those of the fully-grown or fourth-stage maggots.

TABLE I.—1913.

Species of Warble-maggot.	First count, April 15th.	Second count, May 7th.	Total identified.
Hypoderma lineatum	580	11	591
Hypoderma bovis .	237	469	706
Third Stage . .	81	44	125

TABLE II.—1914.

Species of Warble-maggot.	First count, April 27th.	Second count, May 11th.	Total identified.
Hypoderma lineatum	144	11	155
Hypoderma bovis .	378	476	854
Third Stage . .	47	39	86

These figures fall far short of the total number of maggots that were in the animals, as very many were destroyed in the operation of extraction and could not be identified. *Hypoderma lineatum* is clearly the earlier fly, and there was a great reduction in the number of maggots of this species last spring (Table II.) as compared with the previous year.

Observations at Athenry have shown that there also *H. lineatum* is earlier than *H. bovis*. Maggots extracted from the cattle there during the months of February, March, and April were all referable to that species, except a few of *H. bovis* in the last consignment received at the end of the last-named month. The early appearance of *H. lineatum*, as compared with *H. bovis*, has been noticed by Gläser and other Continental students. At Athenry the "fly season" generally seems rather earlier than at Ballyhaise.

For the purpose of trapping the maggots as they emerged, four animals were kept tied up for about a month in the spring of 1913, and this year four others were tied up for the same purpose. The maggots were caught in small zinc or wire gauze traps, like those described in the first report of this series. When the maggot is ready to emerge it is almost black and the breathing-hole is large ; this is the time to put on the cage. The maggots always emerge very early in the morning and in good weather. In this way, during the spring of 1913, 35 maggots were captured ; three were identified as *Hypoderma lineatum* and the others as *H. bovis*. The maggots were put, immediately after they had emerged, into boxes in which were placed sods of earth, and which were covered with wire gauze ; they were kept in the open in all weathers to ensure natural conditions. Two *lineatum* and 23 *bovis* flies emerged, confirming in every case the identifications already made on the larvæ. Flies had developed in the other puparia but had perished ; about half the flies were males and half females. The specimens of both species passed about eight weeks in the pupal stage. This last spring (1914) 35 maggots were obtained in the same way, 6 *lineatum* and 29 *bovis*. No *lineatum* flies emerged although they developed in the puparia, but 25 *bovis* flies were successfully reared, 15 males and 10 females. The flies emerge very early on bright sunny mornings.

Emergence of Flies.

This last summer the pairing was watched, on one occasion, in a cage to which the reared flies had been transferred. The operation lasted only for a few minutes. Male flies are much more active than females when they emerge ; unless transferred at once to a cage in a dark place they damage themselves badly by flying against the wire gauze covering of the box. From the flies thus obtained a careful comparative study of the external reproductive organs in the two species has been made for the first time and published,* showing that they are to be distinguished by very definite structural characters.

Egg-laying.

As the calves were confined in a pen we had a good opportunity of watching the fly at work egg-laying during both summers. The fly almost exclusively lays its eggs on the legs, not confining itself to any particular part, but showing a decided preference—at least as regards *Hypoderma bovis*—for the heel or hock-joint of the hind-limbs. We saw the flies strike the calf a few times on the side and very often on the flanks and hips, but never on the back. The fly works very quickly, but only for a few minutes at a time. *H. lineatum* lays her eggs on the hairs in rows (Fig. 1), and

**Scientific Proceedings of the Royal Dublin Society* (Vol. xiv. 1914, No. 19).

must therefore cling on for a few minutes while laying them. *Hypoderma bovis*, however, lays her eggs singly and quickly, and the animals get very excited; it has been observed by Gläser that *H. bovis* annoys the animals more than *H. lineatum*, the difference being probably due to the method of egg-laying, but we cannot confirm the statement as we have never had an opportunity of watching the latter fly at work. At Athenry, however, our attention was called to eggs of *H. lineatum* laid in numbers on the hairs of cows' thighs, not far below the root of the tail. As the hairy covering in this region is short and scanty good opportunity was thus afforded for observation.

One day while we were watching the calves at Ballyhaise, as they were crowded in a corner of the pen, one of us happened to touch a calf lightly on the leg with the point of a stick; the animal kicked violently and got excited. This led us to repeat the experiment, touching different parts of the body; we found that the calves became annoyed and excited and commenced to gad if touched on any part of the legs or flanks, but they did not stir if touched on their backs. This led us to conclude that the mere irritation caused by the fly touching the calf in its persistent attacks is enough to cause the animals' gadding and terror; they cannot get rid of the fly unless they plunge into a river, or find shady shelter. The calves might be supposed to have a natural instinct that the fly is their enemy because they gad the very first moment it attacks them and they do not seem to mind the dozens of other flies some of which are blood-sucking; the common "Clegs" (*Haematopota*) for example, which abound at Ballyhaise, excite the animals simply to shake the skin. Very few eggs can be obtained by examining a calf's legs, but by putting a captured fly "sleeved" in a wire gauze cage on a calf's back or side, she will lay sometimes, not always, quite a number of eggs. We could not always be sure of thus obtaining them, but this seems to be the only way of getting a satisfactory number of eggs to work with.

During the summer of 1913 we got a fly by the above method to lay eggs; on the first occasion 60 eggs were laid in an hour, and on the second occasion 24 eggs were laid in a much shorter time. They were laid singly, attached to the hairs near the skin; rarely two were laid on one hair, but some were dropped quite loosely among the hairs. The fly while laying remained very quiet, so quiet that one would have concluded that she was not laying eggs at all. We also got eggs from flies confined in small glass tubes; they were laid sometimes loosely and sometimes on the hairs with which the tube was plugged. During the present summer eggs were only on one occasion laid on a calf under observation although many trials were made, but quite a number of eggs were obtained in tubes. One evening a captured fly laid 33 eggs on hairs in a tube,

THE WARBLE FLIES.

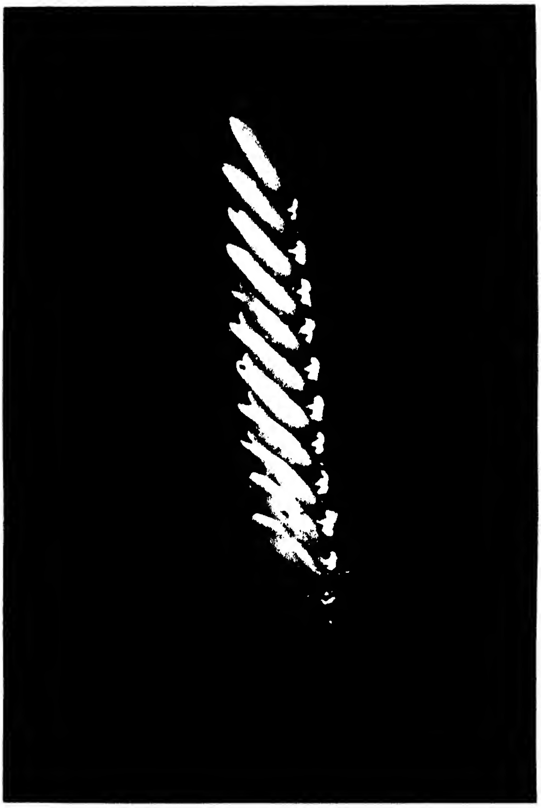


Fig. 1.—Eggs of Hypoderma lineatum attached to Hair of Cow.

Five of the Eggs are hatched and six unhatched. Magnified 15 times.

THE WARBLE FLIES.

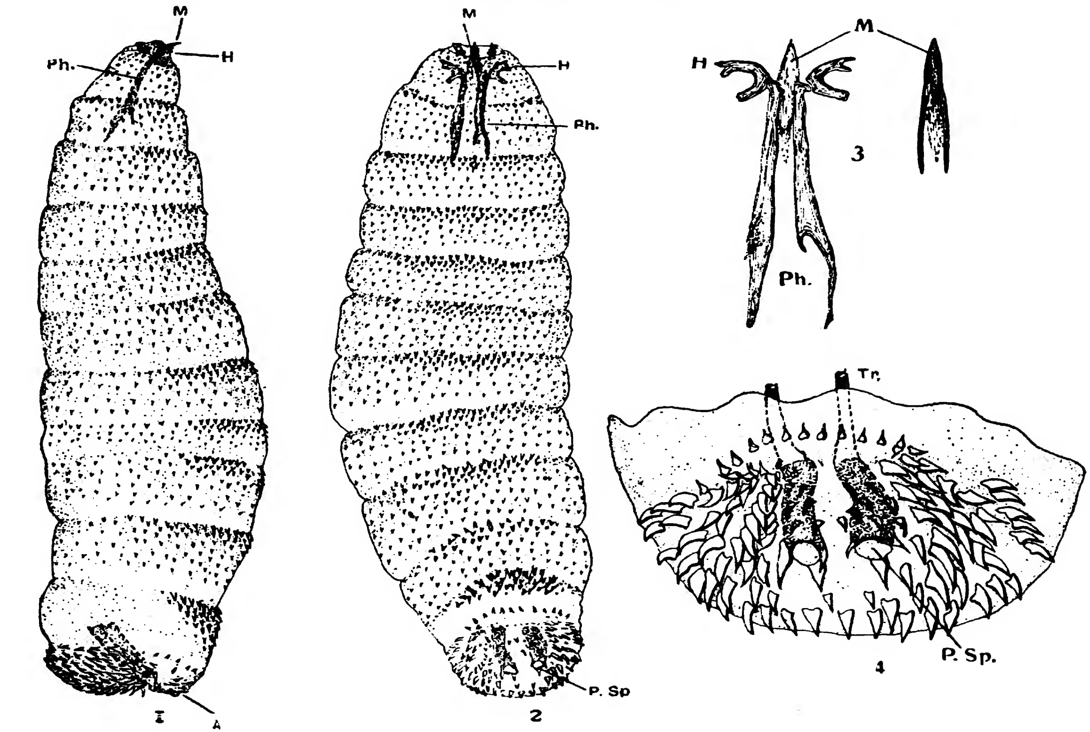


Fig. 2.—Newly-hatched Larva of Hypoderma bovis.

(1) Side view. (2) Ventral view—magnified 125 times; Ph., Skeleton of Pharynx. (3) Mouth-hooks (H) and Median tooth (M)—magnified 325 times. (4) Hinder-end of Larva—magnified 325 times; P.Sp., Spiracles; Tr., Air-tubes.—(*From Sci. Proc. R.D.S.*, vol. xix.)

and on another evening a reared fly laid over 100 on a piece of cotton wool; those of the latter batch unfortunately must have been unfertilized as none of them ever hatched.

Hatching of Eggs.

Last summer we observed that the eggs laid by *Hypoderma bovis* on the calf which we were watching, changed in colour on the fourth day after being laid. We found when we took them off and examined them more closely that they were empty shells split open at the apex. The next time eggs were found on the calf some were taken off every day, examined, and put into an incubator at body temperature. On the third day the little maggots could be seen ready to hatch, so we removed all the eggs and put them into the incubator; on the fourth day the eggs had hatched, and on examining the slide seven little maggots were found. These were dead, so it was not possible to use them for experimental purposes, but they provided material for a description of the outward structure of the first-stage larva, which has been published this year.* The accompanying photograph (Fig. 1) of a row of eggs of *H. lineatum* from Athenry shows their appearance before and after hatching.

Structure of the First-stage Maggot.

Until the observations made in the summer of 1913 by Gläser in Germany, and by ourselves at Ballyhaise, the first-stage larva of a warble-fly had never been seen outside the egg. The so-called first-stage maggots mentioned by various writers as found in the gullets of cattle (including the specimen figured in this JOURNAL, Vol. IX., 1909, p. 476, fig. 2 A) are really early second-stage larvæ. The newly-hatched maggot, though only ·8 mm. ($\frac{1}{30}$ inch) long, is distinguished by the relatively immense strength of its mouth-hooks, and of the spiny armature in transverse rows across its segments especially on the ventral aspect (Fig. 2). Between the strong mouth-hooks (Fig. 2, H) is a sharp spine (Fig. 2, M), directed forward; this is used for breaking through the egg-shell at hatching. The spines at the thickened tail-end of the maggot, in the neighbourhood of the hinder spiracles or air-holes (Fig. 2, P.Sp), are like strong hooks, curved towards the dorsal region. The spines on the body-segments generally point backwards, so as to give the maggot a firm hold in the direction of its progress. The whole aspect of this little larva suggests that it could bore as readily through the skin as through the mucous coat of the gullet. That it does bore into the skin we are convinced as the result of the muzzling experiments and of the direct observations that we have been able to make.

* *Sci. Proc. R.D.S.* (Vol. xiv., No. 19.)

Muzzling Experiments.

It will be remembered that in the last report attention was called to the small number of warbles in the spring of 1910 on those yearlings which, during the summer of 1909, had as calves been protected by wire and leather muzzles by day, and tied between stakes at night, so that they could not lick themselves. The five calves thus treated had an average of 2 warbles per beast, being entirely free at the second count, while the fifteen "control" animals had an average of 6·33. From this result a partial protection at least, from muzzling was inferred, and it was concluded that some of the maggots, at any rate, probably enter the beast's body by the mouth.

No muzzling was tried during the summer of 1910, but ten calves were subjected to the test in 1911, wearing the wire and leather muzzles from the beginning of May until the end of September. Sixteen "control" animals were grazed unmuzzled in the same field. The result given in the appended table shows a less marked apparent protection for the muzzled calves than in 1909-10, though these at the second count were again found quite free from warbles. The experiments in these years were carried out by Mr. T. H. Corson.

TABLE III.

Ten Calves Muzzled through Summer, 1911. Warbles counted, Spring, 1912.

Number of Animal.	First count, 29th April. Number of Warbles.	Second count, 24th May. Number of Warbles.
30	2	0
31	3	0
32	2	0
33	11	0
34	8	0
35	15	0
36	8	0
37	16	0
38	5	0
39	14	0

NOTE.—Calves Nos. 36 and 37 got their muzzles off on one occasion in the field.
Total 84 Warbles. Average number of Warbles per head: 8·4.

Table IV.

Sixteen Unmuzzled or "Control" Calves, 1911. Warbles counted, Spring, 1912.

Number of Animal.	First count, 29th April. Number of Warbles.	Second count, 24th May. Number of Warbles.
1	4	4
2	12	1
3	3	2
4	2	1
5	15	3
6	35	0
7	10	6
8	7	7
9	11	2
10	5	3
11	16	2
12	6	2
13	3	0
14	0	7
15	6	7
16	16	5
17	10	8

Total, 221 Warbles. Average number of Warbles per head : 12·9.

No muzzling was tried during the summer of 1912, but the experiments have been continued during the summers of 1913 and 1914. In the former year 9 calves were subjected to the muzzling treatment, and 11 were grazed with them as "controls," and during the present summer (1914) 10 calves have been muzzled and 10 grazed with them as "controls."

The calves in previous years had the freedom of the whole field, but during the last two summers they have been confined in a pen in an exposed area to ensure to all an equal chance of attack by the fly ; for it had been noticed that in other years the muzzled calves, being unable to graze, lingered about in sheltered places,

while the others kept themselves more exposed, and we now believe that this was the true reason for the small proportion of maggots in the muzzled calves in 1910 and 1912. This consideration also goes far to explain the absence of maggots at the second count of the muzzled calves, which would naturally have an increasing tendency to seek the shade as the summer advanced and the weather became hotter. The calves were watched every day during the time for which they were muzzled. During the summer of 1913 they were attacked by flies on only nine different days, the earliest being the 1st July and the latest the 15th September. During the present summer (1914) they were attacked on only eight days, the first being the 22nd June, and the last the 21st July. During the summer of 1913, 11 *H. bovis* flies were seen to attack the calves; 8 of the flies were captured. During the present summer a similar number, all *H. bovis*, were seen and 9 of them were captured. Last spring all the maggots extracted from the experimental lot of calves were of the species *Hypoderma bovis.*

The following table shows the results obtained from the muzzling n 1913.

TABLE V.

Nine Calves Muzzled during Summer of 1913. Warbles counted Spring, 1914.

Number of Calf.	Maggots extracted, 1914.				
	27th March.	6th April.	22nd April.	1st May.	3rd June.
71	6	0	4	21	3
82	18	4	13	6	1
83	0	4	4	5	0
4	4	2	7	5	2
5	1	1	6	12	0
7	0	1	0	3	0
8	0	0	0	2	0
9	6	1	13	4	1
10	5	1	8	15	0

Total, 194 Warbles. Average number of Warbles per head : 21·55.

TABLE VI.

Eleven Unmuzzled "Control" Calves. Summer of 1913.
Warbles counted Spring, 1914.

Number of Calf.	Maggots extracted, 1914.				
	27th March.	6th April.	22nd April.	1st May.	3rd June.
18	0	0	0	23	2
19	0	0	5	10	2
20	0	0	0	11	4
21	0	0	0	6	5
22	0	0	3	15	3
23	0	0	0	25	7
24	0	0	3	5	0
25	0	0	3	11	0
26	0	0	1	6	2
42	0	0	1	5	0
81	0	0	0	7	1

Total, 166 Warbles. Average number of Warbles per head: 15·0.

These results in the first place indicate no protection from warbles for those calves which cannot lick themselves, and confirm the opinion derived from the early muzzling experiments that the maggot usually enters the host's body through the skin, although from the apparently opposite result obtained in 1909 it was concluded that the muzzling might be a partial preventive. The probable reason for this, in the tendency of the muzzled calves to seek shade while the "controls" remain in the open field, has already been discussed. It was very surprising in the year 1912 that the muzzled calves had warbles only at the first inspection; this is in correspondence with the figures of this year, which show that warbles were present in the muzzled calves a month earlier than in the unmuzzled. We can offer at present no explanation of this curious fact. The parasites did not disappear in the muzzled at the final count in 1914, although they diminished in number. The calves were examined every fortnight to ensure that all the maggots should be counted. The highest numbers were got in both lots on the same date—the first day of May. The high average of the muzzled is indeed astonishing, and compels us to abandon the idea that the maggots enter by the mouth. The calves could not possibly have

licked themselves from June 9th—they had been housed until then—until the 16th October, when the muzzles were taken off. The results indicate that the tongue, far from aiding the parasite in its career, rather inhibits its progress and reduces the number of maggots found in animals that can lick themselves.

Clothing Experiment.

Four calves were partly clothed during the summer of 1913, from the 18th June until the end of September. Two had their backs protected with covers, and two their legs with leggings, made of strong linen. The leggings at first were hard to keep on and the calves got them off a few times, but the covers were easily kept in place. Each calf had a small pen to itself, to prevent it from chewing another's straps and ropes. They were never observed to gad, which was probably due to their pens being on higher ground than the pen of the other calves, though all the pens were in the same field. At the counts this spring those with their backs covered had two warbles each, while those with the leggings had none. This result shows that the maggots reached the back although the eggs could not have been laid there. Covering the back, therefore, is no protection, but covering the legs seems to be effectual, in correspondence with our observations recorded above (p. 107) as to the place of egg-laying. During the summer of 1914 we had four calves with their legs covered, and none with their backs covered. The pens were in the same position as in 1913, but we determined to release captured flies among them. The calves were never observed to gad, and there was only one opportunity of releasing a fly. It did not, however, attack them but flew back to the muzzled calves, so it is to be feared that this experiment will yield no further information.

Feeding Calves with Eggs and Maggots.

During the summer of 1913 six calves were kept housed and never allowed out. To three of these were fed 16 newly-laid *Hypoderma bovis* eggs each ; the other three were kept as "controls." The calves were never out until after the counts this spring (1914), and not one of them had any warbles. This result tells strongly against the view that the parasite gains entrance to the host's body by the eggs being licked in. There remains, however, the possibility that the young maggots might be licked in. Therefore during this last summer (1914) six calves have been housed, and to three of these have been fed three newly-hatched maggots each of *Hypoderma bovis*. It was intended to feed a large number of maggots, but want of material prevented this. The other three have been kept as "controls," and none of them will be allowed out until after the maggot-season next spring.

Boring of the First-Stage Maggot into the Skin.

The presence of numerous eggs of *Hypoderma lineatum* on the thighs of cows at Athenry in June has been mentioned above. It was observed by Mr. Lang, the cattle herd there, that a few days after the eggs had been laid a soreness in the neighbouring region of the skin with a discharge of matter appeared. On visiting Athenry we confirmed this valuable observation, and the cows, standing quietly in the byre, proved better subjects for examination than restless calves in the field. On looking with a lens at the skin near the newly-laid eggs, we saw that it was perforated with minute holes from which flowed a watery discharge, hardening on the surface to form a scaly deposit (Fig. 3). After a day or two the region became covered with small pimples (Fig. 4), which disappeared a few days later. On squeezing the skin of the earliest "case" that could be obtained, some clear watery fluid exuded from the holes, and on examining a smear of this under the microscope we were delighted to find a newly-hatched maggot of *H. lineatum*.

In July, 1914, fifty eggs of *H. bovis* were obtained at Ballyhaise, seventeen from a fly "sleeved" on a calf, and the rest from a fly confined along with the hairs in a glass tube. These were placed in the incubator, and on the fourth day twenty-four live first-stage larvæ were obtained. Unfortunately the other twenty-six eggs did not hatch. Nine of the maggots, three each, were fed to three calves by putting them on their tongues (see above, p. 114). Seven were preserved, and the remaining seven served for observations of their movements on the skin of one of the calves. A great deal of mystery has surrounded the fate of these little maggots after hatching owing to the difficulty in obtaining them, and they are so small and so nearly transparent that it is hard to watch them, even with a lens. Last year Gläser, working in Berlin, put them on a shaved patch on a calf, but according to him they made no attempt to bore through. Instead of shaving we clipped closely a small patch on the shoulder of a black calf, thus keeping the conditions more nearly normal, and put the seven maggots on it. They were very difficult to watch owing to the trouble of keeping the calf steady, and they were almost the colour of the skin. Immediately they were put on the hairs they crawled down them to the skin, and directed their bodies perpendicular to its surface. We soon found that they were slowly disappearing into the skin, four were lost sight of, but the other three were watched cutting into the epidermis with their mouth-hooks and occasionally bending the hinder region of their bodies until they disappeared completely.*

* This observation was made by one of us (T. R. H.), and confirmed by Mr. R. G. Whelan, A.R.C.Sc.I., Superintendent at Ballyhaise Agricultural Station.

It took them about six hours to get into the skin; possibly hair follicles may have facilitated entrance. Next morning there were three little eruptions or pimples just where they had entered, and we found four other little pimples indicating where the other maggots, which had been lost to view, had also bored in. On the calf from which the eggs had been taken we let about a dozen eggs remain on the hairs; these were taken off on the succeeding morning and found to be empty shells. The skin near these, when examined, exhibited a number of small pimples, easily seen with the naked eye, and resembling those observed on the cows at Athenry as already mentioned; they became a little larger during the day, and apparently burst during the following night, because next morning they were dried up and a small scab had been formed. We examined them, but found no trace of the maggots. In about a week all trace of the pimples was gone, not even a scar being left. The calf experimented on was one of the muzzled lot and was kept for three days tied between stakes to facilitate observation so that it could not injure the eruptions by rubbing them. The calf appeared to feel the maggot piercing the skin at first, because its restlessness made observation difficult, but the symptoms of discomfort soon passed away.

These observations confirm the belief deduced from the muzzling results that the maggot enters the animal's body through the skin and not by the mouth and gullet. As the eggs are laid on the lower parts of the animals, seldom if ever on the back, and as the maggots, according to our observations, enter the skin somewhat below the position of the eggs, it remains to consider by what course the parasite finds its way to the back.

Wanderings of the First-stage Maggots in the Host's Body.

The earliest second-stage maggots of Warble-flies found in the bodies of cattle have been recognised now for many years past in the sub-mucous coat of the gullet. We have shown that the first-stage maggot burrows into the skin close to wherever eggs have been laid (or placed), on the legs or elsewhere. From this and from the result of our muzzling experiment it might be inferred that, if the gullet-larvæ have entered by the mouth, they never complete their transformations. Some Continental students of the question have suggested that all maggots found in the gullet must be regarded as having lost their way and destined to perish.* There

* For example Stüb (*L'Hygiene de la Viande et du Lait*, July, 1911) who states that the larvæ of Hypoderma penetrate both by the gullet and by the skin, but that "in the majority of cases the larvæ which enter through the skin develop well, while the larvæ which enter by the gullet die." In support of this view he describes holes through the skin of the back in the neighbourhood of larvæ lying in the sub-cutaneous tissue; but from the time of year when these holes were found, they must have been incipient breathing holes bored *from beneath*.

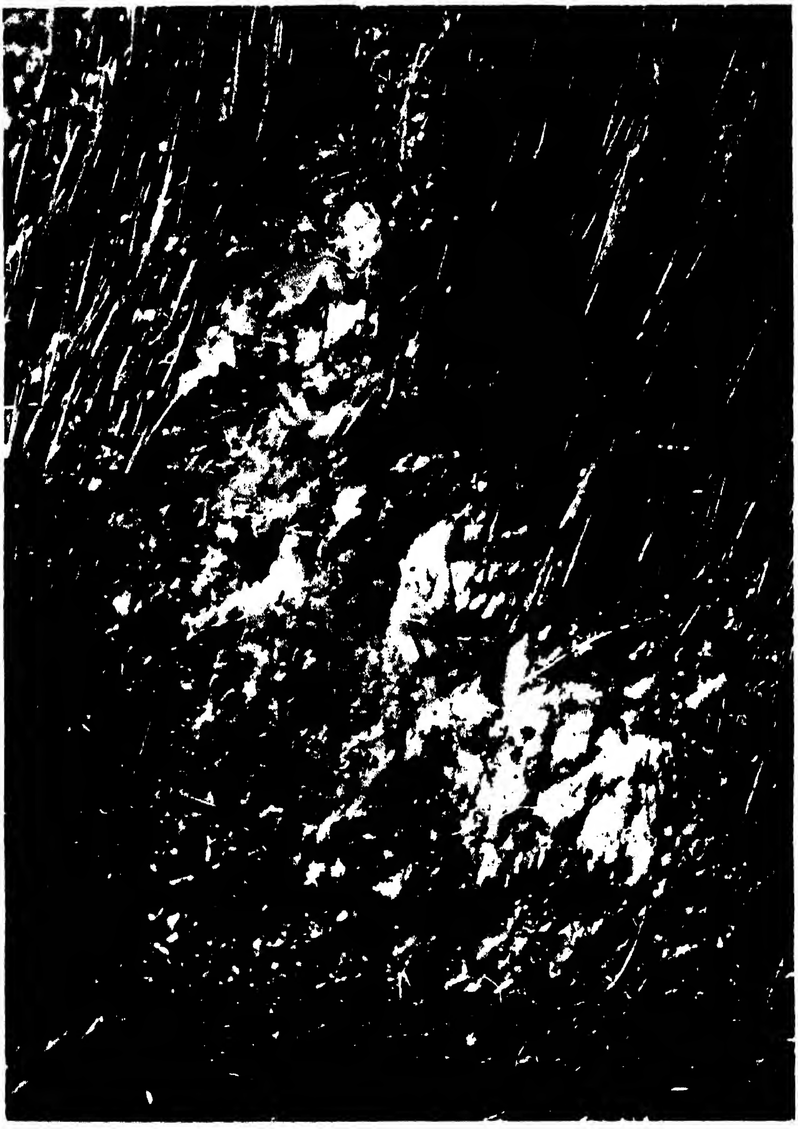


Fig. 3.—Entrance-hole of Hypoderma lineatum Maggot into Skin of Cow.

Magnified 15 times.

The hairs around the hole have been clipped short. The white incrustation is due to hardened discharge from the hole.

Fig. 4.—Skin of Cow (hindquarters) shewing pimples where H. lineatum Maggot have entered.

Slightly Reduced.

is, however, no reason why the maggots should not make their way through the host's body from the skin of the legs to the gullet and thence to the back.

Having seen the entrance holes of the newly-hatched larvæ in the skin of the Athenry cattle, we naturally wished to track their further course, and two cows were slaughtered for our examination. A careful search in the skin and the underlying fatty and muscular tissues failed, however, to reveal any maggots. We traced the entrance holes through the epidermis, but in no case could we follow them further than the superficial layers of the dermis. This may indicate that the little larva enters a small vein and is carried in the blood stream at least part of the way towards the submucous tissue of the gullet. On account of the minute size of the larva at this stage it would be hard to distinguish it in a bullock's body, but we hope next season, to have an opportunity of clearing up the problem of its course, and also of finding out where it assumes the second-stage form.

Second-stage Maggots in Gullets.

We have been able to examine a large number of gullets and stomachs of cattle from the Dublin meat-markets and we find that the period of the year during which the warble-maggots are found in the submucous coat of the gullet is fully consistent with the generally received opinion that this region serves as a normal resting-place for the parasites on their way to their final position beneath the skin of the back. The examination has been carried on throughout the year in the laboratory of the Veterinary Hygiene Division of the Department, the work kindly facilitated by Mr. F. C. Mason, M.R.C.V.S., the head of that division. The following statement shows the results.

	No. of Gullets examined.	No. of Gullets containing Larvæ.	Percentage of affected Gullets.	No. of Larvæ.	Average No. of Larvæ in each affected Gullet.
1913. Oct.	35	3	8·5	26	8·66
„ Nov.	80	20	25·0	123	6·15
„ Dec.	92	14	15·3	157	11·2
1914. Jan.	96	16	16·6	254	15·87
„ Feb.	138	8	6·0	55	6·87
„ Mar.	164	2	1·21	5	2·5
„ Apr.	171	0	0	0	0
„ May	232	0	0	0	0
„ June	152	0	0	0	0
„ July	82	0	0	0	0
„ Aug.	92	1	1·08	1	1
„ Sept.	161	2	1·25	4	2

From these figures it can be seen that the appearance of larvæ in the gullet begins in August (on the 26th of the month in 1914), and that the number of affected gullets and of larvæ rises till November, when the maximum is reached. In December and January there is a slight decrease in the proportion of affected gullets, but the average maximum of maggots then becomes highest, and it is in these months that the maggots first appear beneath the skin of the back. In February, when they become common in the latter position, the number in the gullet shows a marked decrease ; in March hardly any are left there (our latest specimen was found on the 14th), and from April till July inclusive, no maggots were found in the gullet at all. These facts altogether support the view that the larvæ make their way to the gullet during the late summer and autumn, and leave it during the winter and early spring, travelling towards the region of the spine.

Professor Peters, working at Hamburg,* found a high percentage of affected gullets (20·37) in August and a maximum in January (32·76) and February (32·42). He states that unless the maggots leave the gullet by March or April, they die and become shrivelled.

Particulars of the position and direction of the maggots found in the gullets were noted, as it was thought that evidence might thus be obtained as to the course of their wanderings. In October the larvæ were near the front end of the gullet—from 6 to 18 inches from the pharynx, and all with the head-end directed towards the stomach. In November also the maggots were found in the fore-half of the gullet, but there were as many with the head-end directed forwards as backwards, and three were lying in the sub-mucous coat transversely to the axis of the tube. In December we found that the majority of the larvæ were towards the middle of the gullet's length or near the entrance to the stomach, some being only four inches from the entrance to the paunch ; as in November the direction of the maggot's head-end varied, about half pointing towards the stomach and half forward. It appears from these facts that the maggots wander to and fro along the gullet during the late autumn and winter, but that their general trend is from the pharynx backwards.

Seventy stomachs were examined between October 1st and February 28th, but no warble-larvæ were found in any of them.

Migration of Second-stage Maggots.

Endeavours have been made to trace the progress of the maggots after they leave the gullet. Our most interesting observation in this connection is the recognition —new, as we believe—of second-stage larvæ just outside the muscular coat of the gullet, as if they had bored through from the sub-mucous coat. On the 20th January in a bullock, 15 months old,

* *Mitt. der deutsch. Landwirtsch. Gesellschaft,* 1912, pp. 156–163.

two larvæ were found in the loose connective tissue outside the muscular coat at the lower end of the gullet. The head-ends of these maggots were directed towards the bullock's back. A week later another maggot was found in a four-year old bullock in the same position as the former two. In a two-year old bullock examined on 16th February, and a four-year old on the 26th February, larvæ were found (one in each) also just outside the muscular coat of the gullet, in the thoracic region close to the diaphragm.

Examination has also been made of the thoracic and lumbar regions in a number of bovine carcases, with some interesting results. In the bullock of January 20th mentioned above, a large second-stage larva was found between the peritoneum and the abdominal face of the lumbar muscles. We are not aware of any records of a warble-maggot in this position, which would be naturally in the track of one making its way from the gullet towards the vertebral region, especially if (as may possibly be the case) it passes upwards by way of the diaphragm. In another bullock (January 22nd) a second-stage larva was found in an interspace between two of the lumbar muscles, separated from the skin by a thick layer of fascia.

We did not succeed in finding maggots within the vertebral canal where they have been seen by many Continental observers. Second-stage maggots were, of course, found beneath the skin from January onwards, becoming replaced by third- and fourth-stage larvæ as the season advanced. Thus we come back to the part of the insects' life-history which has been well-known for more than a hundred years.

II.—THE DESTRUCTION OF WARBLE-MAGGOTS.

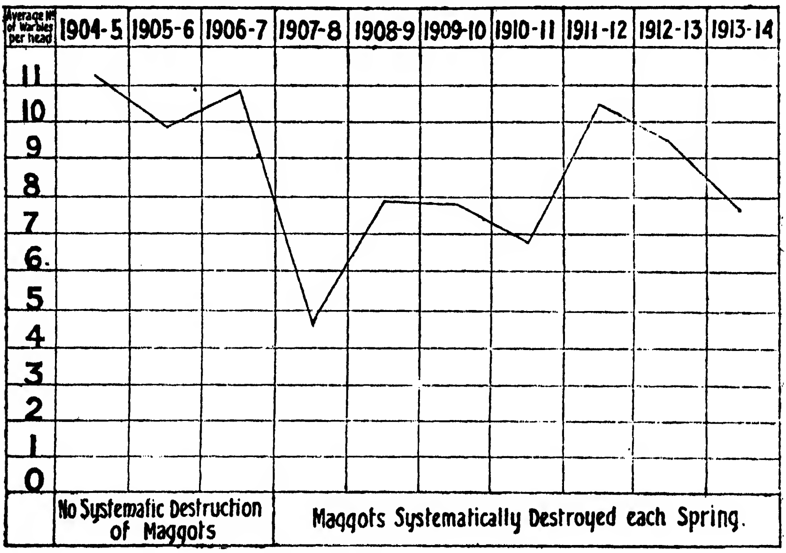
By Jas. L. Duncan, B.Sc. ; Thomas R. Hewitt, A.R.C.Sc.I. ; and D. S. Jardine, A.R.C.Sc.I., F.I.C.

Result of Maggot Destruction.

The last report of this work, published in 1910, gives the results of three years' systematic destructions of the maggots on all the animals on the farm of the Agricultural Station, Ballyhaise, Co. Cavan, every spring. This systematic destruction, by squeezing out the "ripe" maggots has been continued up to the present. It was hoped that by destroying the maggots and thus reducing the number of flies, the pest could be almost eradicated from the farm. Although after the first year's

destruction the average number the following spring was reduced considerably, since then it has only had the effect of keeping the average down, and fairly constant (see Diag. I). When the animals are classified (Diag. II) it is seen that the cows have a much lower average than the young animals, and it will be noticed that the yearly average for the calves tends to fluctuate the most. It appears that the fly prefers the younger animals to the old, but there is

DIAGRAM I.—ALL BEASTS ON FARM TOGETHER.

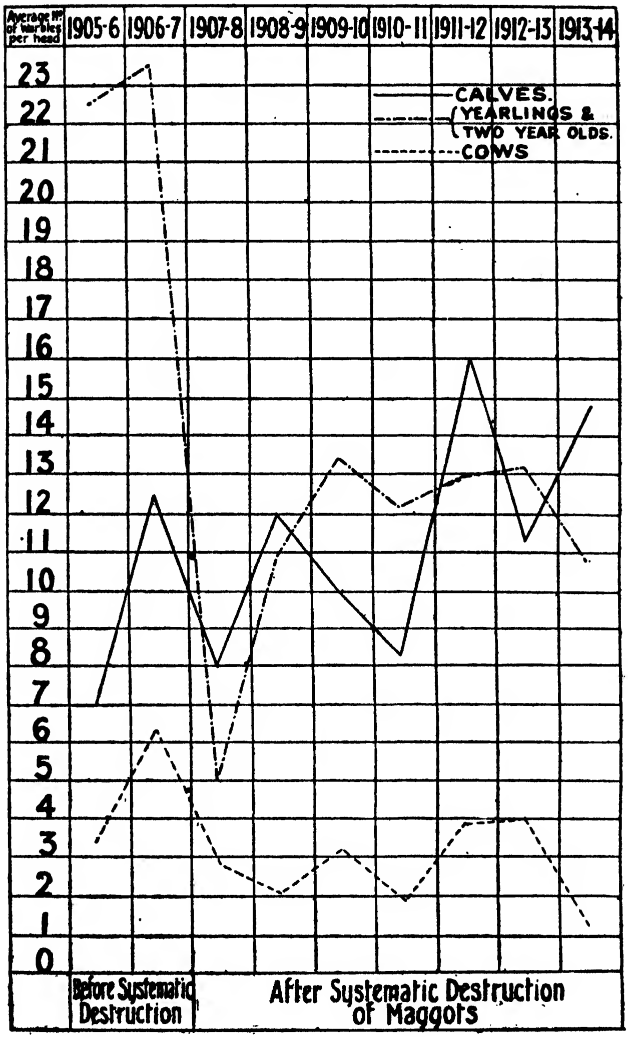


another factor which may have an influence: the liability of certain pastures to get infected with the puparia more than others. Where animals are grazed during the early months of the year there is a good chance of the pasture getting badly infected especially with *Hypoderma lineatum*, while the pastures in the centre of the farm, on which the cows are grazed, have not the same chance of infection as the other pastures, as the cows are not out until about the beginning of May, and most of the warbles have been by that time destroyed. This, however, is not likely to be the sole cause of the low average, as it is a general belief among farmers that younger animals have always more warbles than the older. The systematic destruction does not destroy all the maggots; some escape, and maggots have been extracted from cows up to the middle of July in the last two years.

The following tables give the number of warbles extracted from each animal and the average number per head. It will be noticed that only animals grazed on the farm during the previous summer are included. Animals purchased during the autumn and spring can have no influence on the number of warbles on the farm, but the maggots are systematically destroyed on all animals, though

it is certain that a small proportion, at least, escape through abnormally late emergence. The counts in the spring of 1911 and 1912 were taken by Mr. T. H. Corson, to whom we are greatly indebted for his valued help in many branches of this

DIAGRAM II.—ALL BEASTS ON FARM CLASSIFIED.



enquiry. The high general average for 1911-12 (due to the abnormally high number of warbles in the yearlings that had grazed as calves in 1911), may be partly explained at least by the exceptionally dry and hot summer of the last-named year.

[TABLE.

SIXTY-ONE COWS GRAZED AT BALLYHAISE, SUMMER OF 1910.

No. of Animal.	No. of Warbles, 1911.	No. of Animal.	No. of Warbles, 1911.	No. of Animal.	No. of Warbles, 1911.
1	0	33	0	70	0
2	2	34	0	72	3
5	1	36	2	74	1
6	0	37	5	75	6
8	12	38	0	76	0
11	1	41	4	78	0
12	1	42	6	79	9
13	0	43	3	80	3
14	0	44	7	81	3
15	0	47	0	83	0
16	1	50	1	84	0
18	1	51	2	87	1
20	7	55	1	88	1
22	12	56	1	89	0
24	3	57	0	90	1
25	0	58	2	91	1
26	3	59	1	317	0
27	2	63	2	343	0
28	3	64	2	344	2
30	1	68	0		
31	1	69	0		

Total, 121 Warbles. Average number of Warbles per head : 1·98.

FORTY-ONE HEIFERS GRAZED AT BALLYHAISE, SUMMER OF 1910.

No. of Animal.	No. of Warbles, 1911.	No of Animal.	No. of Warbles, 1911.	No. of Animal.	No. of Warbles, 1911.
1	11	15	2	10c	13
2	17	16	2	17a	22
3	4	17	26	23a	22
4	10	18	16	29	33
5	2	19	24	35	0
6	4	20	21	40	6
7	16	21	8	52	9
8	22	22	17	54	4
9	7	23	16	61	36
10	7	24	17	62	5
11	12	25	12	66	1
12	9	3a	9	71	0
13	35	7a	1	77	23
14	3	9a	5		

Total, 509 Warbles. Average number of Warbles per head : 12·42.

THIRTY-FOUR CALVES GRAZED AT BALLYHAISE, SUMMER OF 1910

No. of Animal.	No. of Warbles, 1911.	No. of Animal.	No. of Warbles, 1911.	No. of Animal.	No. of Warbles, 1911.
1	9	13	10	25	5
2	12	14	2	26	11
3	6	15	8	27	0
4	5	16	8	28	5
5	12	17	4	29	6
6	33	18	7	30	7
7	23	19	5	31	2
8	3	20	10	32	2
9	11	21	18	33	4
10	5	22	3	34	2
11	12	23	10		
12	1	24	19		

Total, 280 Warbles. Average number of Warbles per head : 8·23.

TOTAL NUMBER OF ANIMALS GRAZED AT BALLYHAISE, SUMMER OF 1910 136.
TOTAL NUMBER OF WARBLE-MAGGOTS EXTRACTED, SPRING OF 1911 910.
AVERAGE NUMBER OF WARBLES PER HEAD FOR ALL BEASTS ON THE FARM 6·6.

FIFTY-NINE DAIRY COWS GRAZED AT BALLYHAISE, SUMMER OF 1911.

No. of Animal	No. of Warbles, 1912.	No of Animal	No of Warbles, 1912	No. of Animal.	No. of Warbles, 1912.
1	0	36	2	74	12
3	5	37	16	75	0
5	3	38	0	76	0
7	0	40	2	77	8
8	0	41	3	79	1
9	3	42	8	80	2
12	2	44	7	81	2
13	6	47	0	83	0
14	1	50	6	84	1
15	0	52	6	87	2
20	1	55	0	88	6
23	15	56	0	89	0
24	2	58	0	90	13
25	1	59	0	91	1
26	6	61	15	317	7
27	1	62	2	343	0
29	33	63	5	344	2
31	3	66	5	536	6
34	1	71	0	537	1
35	1	72	5		

Total, 230 Warbles. Average number of Warbles per Animal: 3·9.

EIGHTEEN BULLOCKS GRAZED AT BALLYHAISE, SUMMER OF 1911.

No. of Animal.	No. of Warbles, 1912.	No. of Animal	No. of Warbles, 1912.	No. of Animal.	No. of Warbles, 1912.
1	25	8	22	15	16
2	4	9	19	16	5
3	81	10	14	17	2
4	10	11	1	18	3
5	27	12	10		
6	7	13	42		
7	6	14	54		

Total, 367 Warbles. Average number of Warbles per head: 20·4.

TWENTY-ONE HEIFERS GRAZED AT BALLYHAISE, SUMMER OF 1911.

No. of Animal.	No. of Warbles, 1912.	No. of Animal.	No. of Warbles, 1912.	No. of Animal.	No. of Warbles, 1912.
1	1	18	0	43	7
2	16	19	2	51	2
3	7	28	17	54	1
8	6	33	0	57	1
11	2	4	8	60	12
16	9	5	7	68	3
17	4	6	20	78	0

Total, 125 Warbles. Average number of Warbles per head: 5·95.

SIXTEEN HEIFERS GRAZED AT BALLYHAISE, SUMMER OF 1911 (APART FROM TWENTY-ONE IN PREVIOUS TABLE).

No. of Animal.	No. of Warbles, 1912.	No. of Animal.	No. of Warbles, 1912.	No. of Animal.	No. of Warbles, 1912.
2819	4	2825	2	2832	26
2820	12	2826	3	2833	55
2821	3	2828	20	2835	15
2822	23	2829	2	2836	12
2823	0	2830	27		
2824	3	2831	11		

Total, 218 Warbles. Average number of Warbles per head: 13·62.

NINETEEN CALVES GRAZED AT BALLYHAISE, SUMMER OF 1911.

No. of Animal.	No. of Warbles, 1912.	No of Animal.	No of Warbles, 1912.	No. of Animal.	No. of Warbles, 1912.
1	22	8	12	15	35
2	28	9	26	16	11
3	21	10	0	17	20
4	7	11	20	18	13
5	26	12	37	19	17
6	0	13	22		
7	30	14	25		

Total, 416 Warbles. Average number of Warbles per head 21·3.

Ten Muzzled Calves with 84 Warbles .. Average 8·4 } See pp. 110, 111 above.
Sixteen "Control" Calves with 221 Warbles Average 12·9 }
Total, Forty-five Calves with 721 Warbles Average 16.

TOTAL NUMBER OF ANIMALS GRAZED AT BALLYHAISE, SUMMER OF 1911 .. 159.
TOTAL NUMBER OF WARBLE-MAGGOTS EXTRACTED, SPRING OF 1912 .. .. 1661.

AVERAGE NUMBER OF WARBLES PER HEAD FOR ALL BEASTS ON THE FARM .. 10·4.

FIFTY-FOUR COWS GRAZED AT BALLYHAISE, SUMMER OF 1912.

No. of Animal.	No. of Warbles, 1913.	No. of Animal.	No. of Warbles, 1913.	No. of Animal	No. of Warbles, 1913
1	5	35	2	66	5
3	10	36	5	71	1
5	5	38	1	72	0
7	10	40	6	74	2
9	1	41	0	76	0
12	0	42	3	78	24
13	4	44	7	79	1
14	4	47	0	80	5
15	9	51	1	87	3
16	3	52	4	88	1
17	2	54	2	89	0
18	1	57	3	317	0
19	8	58	0	343	7
20	2	59	1	344	7
24	0	60	6	536	6
26	5	61	18	537	6
29	4	62	6	788	4
34	5	63	3	937	3

Total, 221 Warbles. Average number of Warbles per head : 4·09.

SEVENTEEN HEIFERS GRAZED AT BALLYHAISE, SUMMER OF 1912.

No of Animal.	No of Warbles, 1913.	No. of Animal.	No. of Warbles 1913.	No. of Animal	No. of Warbles, 1913.
6	13	33	5	75	4
11	4	50	6	81	2
23	7	55	3	83	4
25	2	64	5	84	0
30	4	69	23	90	19
31	1	70	11		

Total, 113 Warbles. Average number of Warbles per head : 6·6.

Twenty-five Heifers Grazed at Ballyhaise (apart from Seventeen above), Summer of 1912.

No of Animal	No of Warbles, 1913	No. of Animal.	No. of Warbles, 1913.	No. of Animal.	No. of Warbles, 1913.
1	8	10	32	19	22
2	8	11	9	20	26
3	6	12	8	21	24
4	6	13	38	22	37
5	9	14	11	23	10
6	15	15	20	24	18
7	7	16	22	25	29
8	35	17	25		
9	46	18	18		

Total, 491 Warbles. Average number of Warbles per head : 19·6.

Fifteen Bullocks Grazed at Ballyhaise, Summer of 1912.

No. of Animal.	No. of Warbles, 1913	No. of Animal.	No. of Warbles, 1913.	Animal.	No. of Warbles, 1913
1	19	6	12	11	10
2	2	7	11	12	8
3	3	8	11	13	13
4	11	9	12	14	8
5	11	10	10	15	2

Total, 143 Warbles. Average number of Warbles per head : 9·5.

Thirty-nine Calves Grazed at Ballyhaise, Summer of 1912.

No. of Animal.	No. of Warbles, 1913.	No. of Animal.	No. of Warbles, 1913.	No. of Animal.	No. of Warbles, 1913.
1	40	14	12	27	5
2	16	15	17	28	2
3	16	16	18	29	3
4	9	17	14	30	1
5	6	18	12	31	15
6	17	19	15	32	2
7	4	20	11	33	8
8	7	21	15	34	7
9	9	22	12	35	9
10	17	23	9	36	20
11	13	24	15	37	14
12	6	25	19	38	10
13	7	26	3	39	5

Total, 440 Warbles. Average number of Warbles per head .. 11.2.

Total number of Animals grazed at Ballyhaise, Summer of 1912 150.
Total number of Warble-maggots extracted, Spring of 1913 1408.

Average number of Warbles per head for all beasts on the farm 9.3.

SIXTY-FIVE DAIRY COWS GRAZED AT BALLYHAISE, SUMMER OF 1913.

No. of Animal	No. of Warbles, 1914.	No. of Animal.	No. of Warbles, 1914.	No. of Animal.	No. of Warbles, 1914.
1	0	30	0	69	2
3	0	31	0	70	4
5	0	33	1	71	0
6	0	34	0	72	2
7	0	35	1	74	1
9	0	36	0	76	2
10	1	38	2	78	0
11	6	40	0	79	1
12	0	41	8	81	5
13	2	42	0	83	0
14	0	44	0	84	0
15	1	47	0	87	1
16	0	51	2	88	1
17	0	52	0	89	0
18	0	54	0	90	1
19	5	55	2	317	0
23	1	57	3	343	0
24	1	58	2	536	2
25	1	59	0	537	4
26	1	62	0	788	0
28	0	63	2	937	12
29	5	66	0		

Total, 83 Warbles. Average number of Warbles per head: 1·2.

TEN TWO YEARS OLD HEIFERS GRAZED AT BALLYHAISE, SUMMER OF 1913.

No. of Animal.	No. of Warbles, 1914.	No. of Animal.	No. of Warbles, 1914.	No. of Animal.	No. of Warbles, 1914.
20	4	68	1	82	1
43	12	73	4	91	1
50	2	75	1		
67	3	77	1		

Total, 30 Warbles. Average number of Warbles per head: 3·0.

SIXTEEN YEARLING HEIFERS GRAZED AT BALLYHAISE, SUMMER OF 1913.

No. of Animal.	No. of Warbles, 1914.	No. of Animal.	No. of Warbles, 1914.	No. of Animal.	No. of Warbles, 1914.
1	17	7	14	13	10
2	5	8	7	14	11
3	5	9	3	15	21
4	5	10	4	16	6
5	6	11	11		
6	9	12	2		

Total, 136 Warbles. Average number of Warbles per head : 8·5.

THIRTEEN BULLOCKS, TWO-YEARS OLD, GRAZED AT BALLYHAISE, SUMMER OF 1913.

No. of Animal	No. of Warbles, 1914.	No. of Animal.	No. of Warbles, 1914	No of Animal	No of Warbles, 1914
1	12	6	30	11	20
2	20	7	24	12	33
3	20	8	24	13	9
4	19	9	9		
5	11	10	30		

Total, 261 Warbles. Average number of Warbles per head : 20·0.

SEVENTEEN CALVES GRAZED AT BALLYHAISE, SUMMER OF 1913.

No. of Animal.	No. of Warbles, 1914.	No. of Animal.	No. of Warbles, 1914.	No. of Animal.	No. of Warbles, 1914.
1	7	7	8	13	12
2	8	8	12	14	14
3	13	9	12	15	6
4	20	10	2	16	6
5	20	11	9	17	10
6	13	12	3		

Total, 175 Warbles. Average number of Warbles per head 10·3.

Nine Muzzled Calves with 190 Warbles .. Average 21·5 } See pp. 112-
Eleven "Control" Calves with 166 Warbles .. Average 15 } 113 above

Total, Thirty-seven Calves with 315 Warbles .. Average 14·35.

TOTAL NUMBER OF ANIMALS GRAZED AT BALLYHAISE, SUMMER OF 1913 140.
TOTAL NUMBER OF WARBLE-MAGGOTS EXTRACTED, SPRING OF 1914 1041.
AVERAGE NUMBER OF WARBLES PER HEAD FOR ALL BEASTS ON THE FARM 7·4.

As a demonstration of the effect of systematic maggot destruction in an isolated area, the clearance of an island is being attempted, and Mason Island, Co. Galway, has been selected for the experiment. It lies about ¼ mile outside Mweenish, off the coast of Carna. There were fourteen cattle-owners on the island in the spring of this year. Messrs. B. O'Sullivan and J. MacDonnell, the Department's Assistant Overseers, visited the island on March 24th and 25th for the first "clearing-out" of maggots. From 26 cows they extracted 147, and from 30 "stores," 57 maggots. Nine calves were then on the island; they had been born after the egg-laying season of 1913. Some difficulty was experienced from one of the islanders who objected to her cattle being examined and treated. A friendly inhabitant (Patrick Connelly) undertook to squeeze out maggots from any cattle that might be brought into the island before the next visit, and he extracted 25 maggots from four additional cows. On April 30th, when our second visit was made, 16 maggots were taken from 24 cows, and 61 from 21 "stores." A third visit on 27th May, resulted in the destruction of 23 maggots from 22 cows and 16 from 15 "stores"; some of the cattle had been sold since April and a few had died. During June, Connelly destroyed 9 maggots in 6 cattle. Altogether 354 maggots were killed from 51 cattle, an average of 6·94 per head.

Attempt to Clear an Island of the Warble-Flies.

Unfortunately owing to the dry weather and the lack of pasture many of the cattle had to be removed to the mainland to graze during the summer. Mason Island was chosen for this experiment, because we understood that there was likely to be very little traffic in cattle between it and the mainland; and it is most disappointing now to learn that there are only about ten cattle that have not been off the island. These, with any calves that may be born before the egg-laying season is over, will be the only beasts from which it will be possible next spring to test the efficiency of this method of exterminating the pest.

Experiments with Smears and Dressings.

Many farmers have complained that squeezing out the ripe maggots, as practised for many years past at Ballyhaise, is too troublesome a method for use on a large scale in ordinary farm work. Attempts have therefore been made to find an effective dressing which may be used for maggot destruction. In the 1910 Report a smear consisting of Archangel tar and paraffin was recommended, but subsequent experience has shown that this mixture, although it kills most of the maggots, has, in many cases, a highly injurious action on the cattle, making the skin very sore and destroying the hair. During the spring of the

past two years, therefore, a number of applications have been tried in the hope that some might be found that would kill the maggots in the backs of the cattle without causing undue pain or suppuration, or injuring the appearance of the beasts. The results of this investigation have been, so far, disappointing, but it is thought advisable to publish them for the information of other workers.

Substances found Useless for Killing Warble-maggots.

Coal tar.
Archangel tar.
Carbolic oil, 10 p.c.
Carbolic wash, 5 p.c.
Formalin, 10 p.c.
Formalin and Washing soda.
Saltpetre and Washing soda.
Barium and Washing soda.
Copper sulphate, 5 p.c.
Copper sulphate and Washing soda.
Boracic acid.
Salicylic acid, 5 p.c. solution.
Salicylic acid and Washing soda.
Iron sulphate, 5 p.c.
Iron sulphate and Washing soda.
Calcium persulphide, 10 p.c.
Common Salt, 50 p.c.
Lard and Sulphur.
Paraffin and Cod-liver oil (equal parts).
Venetian turpentine, Cod-liver oil and Carbolic tetrachloride, 5 p.c.
Venetian turpentine and Paraffin.
Linseed oil and Resin paste.
Resin and Turpentine varnish.
Resin and Turpentine varnish with 20 p.c. Tar.

Substances found to Kill a small Proportion of Maggots on each Animal.

Machine oil.
Cod-liver oil.
Seccotine.
Paraffin (1 part), and Naphthalene (3 parts). (Injurious to skin.)
Paraffin (3 parts) with Linseed oil and Resin smear (1 part).
Resin and Turpentine varnish, with 10 p.c. Sulphur.
Cod-liver oil (6), Gas tar (4), and Carbon disulphide (1).

Substances found to Kill from 20 to 60 Per Cent. of Maggots on each Animal.

Cod-liver oil (12 parts), Wood tar (8 parts), and Nicotine (1 part).	Killed 20 p.c.
Cod-liver oil (12), Gas tar (8), and Nicotine (1).	
Cod-liver oil (12), Wood tar (8), and Carbon disulphide (2).	Killed 30 p.c.
Cod-liver oil (10), Venetian turpentine (10), and Nicotine (1).	Killed 60 p.c., but damaged hair

Substances found to Kill all or nearly all the Maggots, but to Injure the Skin and cause Loss of Hair.

Linseed oil and Resin paste (1 part), with Paraffin (9 parts).

Archangel tar (3 parts), with Paraffin (1 part).

This last-named smear (Archangel tar and Paraffin) has already been mentioned as frequently harmful to the cattle, though deadly to the maggots; some beasts, after being dressed, lay down as if in extreme pain like a horse with colic. It is inadvisable, therefore, to recommend its use. On some cattle it was sprinkled instead of being smeared, and the injury to the skin in this case was slight, but only half the maggots were killed. It was rendered harmless to the maggots as well as to the cattle, when diluted with vaseline.

A smear composed of equal parts of Paraffin and "Middle" (Mineral) oil, killed 39 out of 40 warble-maggots on the first beast to which it was applied. It was disappointing afterwards to find that it had no effect on the maggots in a number of other cattle. Probably there was some peculiarity about the skin of the first animal treated.

Sulphur Dioxide.

The most hopeful result of this section of the enquiry is the discovery that sulphur dioxide gas applied under pressure individually to each warble for less than a minute, kills 93 per cent. of the maggots and causes no harm whatever to the cattle. Such individual application might, however, be difficult on a large scale, and it was disappointing to find that when the gas was liberated under an air-tight rubber cover, spread over the animal's back, very few maggots were killed by it. Perhaps some effective means for using this gas may be worked out next year.

BARLEY CULTIVATION IN DENMARK.

*** *The following article is a translation of a pamphlet published recently by he Danish Brewery Association* (DE FORENEDE BRYGGERIER), *Copenhagen. It is reproduced here by the courteous permission of he Association. The recommendations to barley growers are based on resu'ts of brewing and field experiments conducted in Denmark, but they cannot fail to be of interest to those who grow barley in this country. It will, indeed, be noted how closely many of the results resemble those obtained in the Irish experiments carried out by the Department of Agriculture and Technical Instruction for Ireland in conjunction with Messrs. A. Guinness, Son, & Co., Ltd., Dublin.*

Introductory.

Owing to the fact that both Danish and foreign brewers are constantly meet'ng with Danish barleys of defective quality, and that many barley growers in Denmark seem to be unaware of the characteristics of malting barley, as compared with feeding barley, the Brewery Association has published the present pamphlet in the hope that both the breweries and Danish agriculturists may be benefited. The pamphlet has been edited with the assistance of the State expert, Mr. K. Hansen, of Lyngby.

The special features characterising malting barley may be summarised as follows:—

(1) A healthy condition and high germination percentage.
(2) Evenness and good cleaning.
(3) Fine plump shape.
(4) Light yellow colour.
(5) Low nitrogen content.
(6) High bushel weight.
(7) Thin, crinkly skin.

The Yield of a barley crop is influenced by the natural properties of the soil, by the method of its cultivation and manuring, by the treatment of the ground in autumn and spring, by the variety of barley, time of sowing, quantity of seed, quality of seed, by the precautions taken against attacks of disease, the weeding, and the conditions of the weather during the period of growth.

The Quality of the crop, *which chiefly determines its money value,* depends not only on the above, but also upon the weather conditions during the ripening and harvest'ng of the crop, upon the degree of ripeness and the manner of harvesting, and upon the treatment during and after threshing.

I.—Cultivation.

Soil.

The best soil for two-rowed barley is a good, healthy clay with a marl sub-soil. Barley also thrives on a heavy clay as well as on a lighter soil, provided the ground is in good condition. On a lean, stiff clay the growth is often very slow; whilst on sandy soil, in most years, it suffers to a considerable extent from the droughts of early summer. On very sandy soil and on bog land it is very difficult to grow good malting barley.

Method of Cultivation.

In order that barley may do well, the soil must be healthy. This is best insured by good draining, and by "marling," if it is found that the soil needs it. Barley thrives poorly on meagre, wet or limeless ground. If the soil is deficient in lime and marling cannot be done, lime should be applied. Finally, the ground should be kept as free as possible from weeds.

Manuring.

Since barley grows quickly and must, consequently, take up all its nourishment in a very short time, the latter must be available in an ample and accessible form in the soil; and in order that the plant may develop normally it is necessary to insure the presence of suitable proportions of nitrogen, phosphoric acid and potash. Stable manure should, as a rule, not be used. Nitrogen should not be applied in excess, as this produces a too-nitrogenous barley, and tends, in a year of heavy yield, to cause the grain to lodge, and also to deteriorate in quality. When the nitrogen is deficient, however, in proportion to the phosphoric acid, the yield will be poor. In those cases where the soil is found to be sufficiently rich in the above constituents, no manure should be applied.

As a rule, however, 134 to 178 lbs. per acre of 18 per cent. superphosphate and 62 to 89 lbs. of potassium nitrate per acre will be beneficial. On poor soils 178 lbs. of superphosphate and 134 lbs. of potassium nitrate will often yield good results, and on hungry soils in a poor state of cultivation these quantities may be increased with advantage. On light and friable soils, where large quantities of root-crops, straw and hay, are sold off the ground, 89 to 134 lbs. of 37 per cent. potash per acre should be applied. The superphosphate and potash should be given in early spring, and the potassium nitrate just before the barley is sown. When quantities exceeding 134 lbs. per acre of potassium nitrate are being used, one-half should be applied before the grain is sown and the rest when the barley has just covered the ground.

If barley is to be grown immediately after a crop of cereals, the stubble ought to be lightly ploughed, and, in addition, lightly harrowed and rolled just after the harvest. The autumn ploughing should be carefully and regularly done, and to the full depth of the ploughshare, and in order that the ground should be in a suitable condition, as early in the autumn as possible. If the barley crop is to follow roots, there should of course only be one ploughing. After the turnips, beet roots, etc., have been removed, the tops of these should be carefully spread, and ploughing should take place at once. After good autumn treatment, the ground in spring should be "clog-dragged." This should be done as soon as the soil is a little dry on the surface, and just before sowing; the ground should be sufficiently harrowed so as to provide a good seed-bed. When the soil is strongly and deeply treated in the spring it becomes dried out and often results in an unsatisfactory seed-bed. Only in cases where the ground is infested with thistles can spring ploughing be considered advisable, and it should then be done just before sowing.

Treatment of the Ground.

Experiments have proved that *Tystofte Prentice** gives with us the heaviest yield. Under proper conditions of cultivation and harvesting, this proves to be an excellent malting barley, which is only slightly attacked by blight, smut, helminthosporium gramineum, etc.

Varieties of Barley.

Abed barley, No. 278, has stiffer straw, yields well, but is subject to "smut."

Princess barley is similar to the "Abed." This variety was derived from the original uneven type of "Prentice" which has now, fortunately, nearly gone out of cultivation.

* It is interesting to note that the original stock of "Prentice" barley was imported into Denmark from the East of England some years ago. The barley known in Denmark as "Prentice" is in reality Archer, a variety cultivated largely in the eastern barley growing counties of England. The following barleys referred to in the context, viz., Tystofte, Abed, Princess and Svalöf Prentice, are selections made from the original lot of seed and propagated as pure-bred cultures—vide p. 144.

Tystofte Prentice was one of the varieties tested in the Irish experiments, but owing to its origin and close similarity to English Archer, also included in the tests, it was named "Danish Archer." The results obtained with Tystofte, Prentice or Danish Archer both in the field and brewing tests were extremely satisfactory, and as a consequence large quantities of seed of this barley were imported into Ireland from Denmark and distributed by Messrs. Guinness. Much of the improvement in Irish barley during the past five years may be traced directly to the accumulating effects of (1) the importation of this seed, and (2) a sustained effort to provide the seed of each succeeding year from the best stocks of the produce of this imported variety. Two important requirements have thus been met—the country has been supplied with a barley well suited to Irish conditions, and the variety is pure-bred and thus capable of producing the essentials of good malting barley, namely, uniformity in size, shape, content, and general character. In addition the farmer is assured a better yield of grain than he could obtain from unpedigreed seed.

Vide "A Summary of Experiments in Barley Growing, conducted during the eleven years, 1901–1911."—JOURNAL, Vol. XIII., No. 1.

Hannchen barley (*Svalöf*) ripens early, stands well, but is somewhat inferior in yield to the Prentice, and is very susceptible to blight.

Old Danish barley has a poor yield, is of poor quality, and is extremely susceptible to "smut."

Chevallier gives a somewhat lighter-coloured grain than Prentice, but the yield is less and the stalk is weak and soft.

Goldthorpe is a satisfactory type and stands well, but the yield, as a rule, is unsatisfactory, excepting on the very best soils. It is also liable to drop the ears on the ground when it gets over-ripe.

A few varieties which were obtained for experimental purposes from Messrs. Garton, the English seed-grower, e.g., "Standwell" and "The Maltster," give good results; they are quite stiff-stalked, but the yield is on the low side.

Among the six-rowed varieties may be mentioned :—

Tystofte Korsbg, a good yielding, but somewhat late variety; and

Erh. Frederiksen, which yields comparatively large crops of fine quality, especially on lighter soils. It ripens early.

Sowing Time.

The rule is that two-rowed barleys should be sown as soon as the ground is quite ready, but not before. According to this, most barley, at all events on the Danish islands, can be sown in normal years in the last ten days of March and the first ten days of April. On the average, early sowing gives as good a yield as late sowing, and further, always gives a stiffer straw, an earlier and safer harvest, and better quality. In particular, "Prentice" and "Princess" barley should be sown early. Late sowing is frequently the cause of impaired quality.

Six-rowed barley, when grown on well-cultivated and manured ground should, if possible, be sown the third week in April.

Amount of Seed.

Sufficient seed should be sown to ensure an even growth. Too close sowing causes the corn to lodge on rich soils, and on poor dry ground produces small ears, with the result of a decreased yield. Too thin sowing on good soil produces a grain of inferior quality, and on the lighter soils, too sparse a growth. In very early sowings it is advisable, other things being equal, to sow somewhat more closely than with later sowings.

When the corn is machine sown, 22 to 45 lbs. per acre less should be used than when it is sown broadcast.

On fertile, well-manured ground, when there is a likelihood of "lodging," 22 to 45 lbs. per acre less should be sown than on a soil which is not likely to give so good a yield. "Prentice" barley

should, as a rule, be sown thinner than the other varieties mentioned.

Having regard to the above, the quantity of seed in the case of two-rowed barleys should, as a rule, lie between the minimum of 134 lbs. per acre and the maximum of 178 lbs. per acre. Only on fertile soils, where drill sowing with a distance between the rows of about 7·9 inches is preferred should a smaller quantity than this be used, and only on light and poor ground, where a weed harrow is to be used, is it advisable to go a little higher than the limits indicated.

In the case of six-rowed barley, under similar conditions, a little less should be used than with two-rowed.

Quality of the Seed.

The seed must in all cases be of the best possible quality, of pure species, i.e., free from admixture of any other species of grain (especially oats and spring wheat) and of pure variety, i.e., the variety must not contain admixture of other varieties of barley. Further, it should be free from seeds of weeds; and all small seeds should be picked out with great care.

The seed should be well developed, perfectly ripe, and well dried. In threshing, the machine should not be set so closely that the skin of the grain is likely to be injured, but at such a point as will enable the seed to run regularly through the sowing-drill. Care should be taken that it does not become mouldy during the period of storage.

Further, the normal percentage of germination should be from 98 to 100.

Precautions against attacks of Disease.

Barley is attacked by "smut" (*Ustilago*), "blindness" (*Helminthosporium gramineum*), "leaf spot sickness" (*Sphaerella exitialis* and *S. basicola*), root-blight, mildew, rust (*Puccinia*), barley-fly grubs (*Chlorops taeniopus*), etc. Several of these, such as rust, mildew, and barley-fly grubs only appear, as a rule, when the sowing has been too late. Mildew and rust, however, may originate in winter barley, and the latter, therefore, should not be cultivated in the immediate neighbourhood of spring barley. "Smut" and "blindness" and to a certain extent "leaf-spot sickness," may be prevented by removing the fungi from the seed. (Directions for doing this will be found in M. L. Mortensen's "Plantesygdomme og disses Bekaempelse" [Plant diseases and their combating], 1910, Part IV. of *Husmandens Haandbog*). Root-blight chiefly appears on soils poor in lime and poorly cultivated. Wire worms attack with the greatest vigour barley grown after root crops. If in places the growth has been perceptibly checked, it is well to apply a small extra quantity of potassium nitrate. This may have a tendency to cause the barley in these particular spots

to deteriorate somewhat in quality, but this would be still more marked if nothing were done to counteract the effect of the wire-worm.

Weeding.

Amongst the most troublesome of the weeds to be found in barley fields may be mentioned thistles, charlock, sonchus (on poorly cultivated ground), and on poor soils deficient in lime, chrysanthemum sagetum. Thistles and sonchus must be combated by rotation of crops, and if necessary, by allowing the ground to lie fallow for one year.

Cutting or pulling up of thistles improves the appearance of the field for a time ; and after a hard rain, the thistles may be pulled up, but this does not exterminate them. Charlock may be overcome by weed-harrowing at the right time, or by spraying with a solution of ferrous sulphate. When the barley is sown in drills with a distance between the rows of 7·1 to 8·3 inches, and with careful hoeing, many seeds may be destroyed ; and further, the loosening of the soil is beneficial to the barley.

Weather Conditions.

In most years the barley is retarded in its growth by a shorter or longer drought in the early summer, and this frequently has an effect on the yield. This is always most marked on ground which is not in a good state of cultivation ; whilst naturally fertile soils, which are also in good tilth, are affected to a far less extent. A light surface ploughing in the spring will also contribute in giving barley some power of resistance against drought. Drill sowing followed by ploughing has a similar result. Cold weather in the spring seems to cause the barley to become yellow in places, but warm weather generally brings the colour back again, and this result is brought about more quickly if the ground in the affected parts is dressed with a little potassium nitrate.

II.—Harvesting and Threshing.

Degree of Ripening.

In order that the barley should be capable of producing the finest quality of malt, it should not be harvested until it is fully ripe, when the grain will be found to be most mealy, the skin finer, and the percentage of germination highest. Barley which is harvested too early is too pale in colour, and has a *rubbed* and somewhat steely appearance ; further, there is a risk of decreasing the yield. It is fortunate that our most important variety—Prentice—can stand perfect ripening without any danger of the grains dropping out of the ears.

The barley may be judged ready to cut when the ears nod heavily, the grains are hard, and the upper joints of the straw appear like

tight-fitting, brown rings. The lower joints, however, may still be protruding, juicy and slightly greenish.

Harvesting or Cutting.

No barley should be cut until it is quite dry from rain or dew. This is of especial importance where automatic binders are used, as is now generally the case on farms growing barley for malting. The more green growth (weeds, clover, etc.) there is among the barley, the better it stands; but, at the same time, it ripens less well; and the sheaves should be made smaller and bound more closely and nearer the top.

The automatic binder is in itself an excellent implement, but it should be used with judgment. When barley which has stood well is bound in large, compact sheaves, and the binding wire is passed round the sheaf too near the root end of the stalks, it will have to stand an unreasonable length of time on the ground before it is dried off sufficiently; and if there is a considerable amount of green stuff growing amongst the barley, and the latter is not perfectly ripe, this operation is rendered still more difficult. However, August is unfortunately the most rainy month of the year in Denmark, and this fact must always be taken into consideration.

Drying.

Immediately after cutting, barley generally contains from 30 to 50 per cent. of water. If possible, this should be reduced by drying off to about 14 to 15 per cent. At the same time, it is important that the barley should be protected, as far as possible, from the effects of inclement weather. In former times it was usual to allow the barley to lie unbound on racks for a few days. When much green stuff was found amongst the corn, this plan certainly facilitated the drying, and under certain conditions a very steely barley would be rendered mealy, but in unsettled weather this method is not at all satisfactory, and even in good drying weather, there is a tendency for the yield to be rendered uneven in quality.

The custom at present is for the barley to be bound at once. After binding, it is set up in rows and left standing thus until carted home to the barns. This method, however, is not altogether satisfactory, and in unsettled autumn weather, the barley is liable to have to stand too long on the ground, which damages the quality of the corn and tends to reduce the value of the straw.

A good plan is to use what is known as "Bornholm stooks." (By this, small, round cocks of unbound corn were originally understood, such as were common on the Island of Bornholm. Now, however, stooks of bound corn are always meant.)

The method of procedure varies somewhat. Frequently the sheaves are at once set up in rows, just as they are thrown from the binder.

If the weather is settled the corn is often allowed to remain standing thus until it is thoroughly dried off. If settled weather is likely to continue and the work of harvesting is well under control, the barley is carted to the barns direct from the rows, and it is thus unnecessary to set up the sheaves in the form of stooks.

Frequently, however, it is found that the sheaves are almost dry in the rows, but the barometer is falling, and the weather reports predict rain. Under these circumstances (which are frequent) every effort should be made to get the barley set up in regular stooks as quickly as possible. This should also be done if the barley has quite dried off, and the weather reports make it doubtful if all of it can be carted home before the rain begins to fall. It is certainly preferable to get all the barley set up in stooks, rather than run the risk of saving half the crop satisfactorily and of having the rest wetted through.

Again, it sometimes happens that the barley has become half dry after much trouble, but that the weather is still unsettled; or that it has been good drying weather for the first three or four days after the cutting, and then becomes threatening. In both of these cases it is a good plan to set it up in stooks. The time which should elapse between cutting and putting into stooks depends upon the degree of ripeness when cut, of freedom from green stuff, how the sheaves are bound and, of course, upon how the barley has dried since cutting. It should on no account be packed together while it is still full of juice and perceptibly damp inside the sheaves from rain. On the other hand, however, barley can very well stand in stooks for a considerable time before being carted in.

The size of the stook must depend upon the condition of dryness of the barley, and from 20 to 100 sheaves may be taken. The butts of all the sheaves must point downward and outward, the stook thus being kept highest in the middle. If possible, it should be well covered with rakings. If the stooks have been well built and the barley properly dried, it may remain for a long time without injury, even in the most unsettled weather; if, however, the stooks have not been put together well, or if heavy rain falls immediately after they have been set up and before they have properly settled, water may penetrate into their midst, in which case they will have to be broken up and rebuilt. If the upper or lower sheaves are damp, they should not be carted in with the rest of the stook, but be left in the field for further drying, and not mixed with the rest of the crop.

To sum up, stooking will prove to be a saving of labour, will tend to keep the work of harvesting more under control, and will also improve the quality and consequently the value of the barley. There will, again, be less likelihood of the crop being carted in too early,

which is frequently a source of great injury to the quality, both from the point of view of the market and of seed purposes.

Carting.

No barley should be carted until both the grain and straw are quite dry. All mixtures of weeds, clover, etc., must be thoroughly dry before the barley is taken to the barns. The sheaves should be examined under the binding wire and at the butt of the straw to see if they are perfectly dry at these places, and this is particularly necessary if they are large and tightly bound. The carting should never be commenced until the dew is dried off, especially if the sheaves are taken direct from the rows.

If the barley is to be used as seed or for malting, great care should be taken to prevent it being mixed with other kinds of barley or grain. It should, therefore, not be put on a barn floor or any place where other kinds of grain are lying about. If it is not necessary to thresh the barley at once, it should be stored in a barn and not in stacks, for even a very small percentage of discoloured corns spoils the whole lot and reduces the price.

Threshing.

If the barley is perfectly dry when it is carted, it may be threshed at once, or the work may be postponed. As a rule, the barley will improve in quality by being left unthreshed for a few weeks. If it has been necessary to cart the barley before it is quite dry (which can always be obviated by stooking) and there is a danger of "heating," every effort should be made to get it threshed at once, as with care the grain may still be saved and sold as feeding barley; but once it has become heated or mouldy it will be of no use for malting. Large bulks of barley frequently depreciate in value or are only of service as feeding stuff by being left unthreshed when in a damp condition.

During the threshing great care should be taken that the machine is not set too close, in order that cracked or crushed grains may be avoided, and the hummeler should also be properly adjusted. Too close threshing is shown by the fact that the ends of a number of corns become uncovered, and again that many grains lack the rachillæ or basal bristles. Properly threshed barley should show a short stub of bristles on the corns. It is obvious that the drum should run regularly and not be tighter on one side than the other, and the machine should, moreover, be fed as uniformly as possible. Careless treatment during threshing will render the very best barley unfit for malting.

Care should be taken that the grain does not become unclean or mixed in the threshing machine, which should preferably have

been used for threshing winter corn immediately before threshing the barley. In steam threshing particularly, unless great care is exercised, a considerable quantity of corn becomes unclean. By allowing the machine to run empty for a short time it will be possible to shake out most of the corn left in it from the previous threshing. As a rule, however, a few sacks of the barley first threshed should be set aside and not mixed with the bulk. The sacks used should, of course, be quite clean, and it is especially important that no oat kernels adhere to them.

III.—Storing of the Barley, etc.

Storing.

If barley is not despatched directly after threshing, but is to be stored for any time, it requires very careful treatment. In cases where the grain is not perfectly dry, it must be spread out in thin layers on a floor where there is a good draught. It should then be well turned, if possible, only in good drying weather. Particular care must be taken with barley which has not entirely "sweated out," or which, owing to wet weather, has been threshed immediately after carting, as this very soon gets heated unless it is kept well turned, with the result that it loses its colour and fresh smell and its power of germination becomes impaired. As it becomes drier, it may be shovelled together into thicker layers.

The Growing of Different Varieties on the Same Farm.

It is not unusual for two different varieties to be grown on the same farm, e.g., an early and a late sort, but it is somewhat difficult to prevent mixing them. When malting barley is grown, it is therefore best to grow only one kind; but even if the same sort is grown on different fields on the same farm, the produce of each should be kept strictly separate, as it is seldom that the crops raised on two fields are alike. The influence of preceding crops, manuring, time of sowing, the mode of cultivation, the time of ripening and harvesting, etc., all tend to bring about differences in quality. The produce of each field may be quite good and even, but when mixed, the bulk may be far from uniform, thus causing irregularities in the malting process, which in turn have an effect on the quality of the beer.

If there are low, damp, or otherwise unsatisfactory spots in the barley field, or if the barley has been attacked here and there by grubs or smut, the barley from these places should not be mixed with the bulk, which it would obviously deteriorate, but it should be sold separately as second quality grain. Even a small percentage of coarse, dark, or brown-tipped barley mixed through a large bulk of excellent quality, is sufficient to cause the entire lot to be regarded as second grade. The previous season's barley should never be mixed with this year's growth.

Sampling.

It frequently happens that a sample is drawn from the first sacks leaving the threshing machine, no regard being paid to the fact that it is most unlikely that such would be typical of the rest of the bulk. Even if the foregoing rules for ensuring uniformity of quality have been strictly carried out, a small portion of the crop is liable to vary in some respect from the whole. Should a sale be effected on the basis of such an unrepresentative sample, the result is generally unsatisfactory, either from the point of view of seller or buyer. If the bulk proves to be of a poorer quality than the sample, the buyer does not, as a rule, have anything more to do with the seller; whilst the latter loses if the bulk is better than the sample. Sampling, therefore, should never be carried out until the whole lot has been threshed, and preferably not until the whole lot is ready for sale. If the samples are taken out of sacks, a small sample should be selected from every fourth or fifth sack; if from a heap of barley lying on a floor, a corresponding number of small samples should be taken. These should be carefully mixed and a final sample taken.*

IV.—The Characteristics of Malting Barley.

The following is a detailed account of the special features governing the value and price of malting barley.

Healthy Condition and High Germination Percentage.

The principal conditions necessary for the production of perfectly healthy barley with a normal percentage of germination (98 to 100) are :—

(*a*) that the barley has grown under normal conditions with respect to soil, nourishment, sowing time, etc.

(*b*) that the development and ripening of the corn have taken place in nearly normal weather.

(*c*) that the crop is perfectly ripe when cut, and that it is well dried when carted, and that it has been stored for four or five weeks previous to threshing.

During the course of this time, the barley under the foregoing conditions, reaches its full power of germination, and after threshing it may be immediately malted. If the barley is to be stored for some time after threshing, it is, as has already been pointed out, necessary for it to be turned in dry weather, especially if the grain is a little damp. If this precaution is neglected, the barley soon develops a disagreeable " loft " smell which, especially if the barley

* ('Barth's sampler' is an excellent device for taking samples from sacks and deep piles of grain. It may be had from P. Brook & Co., 38 Frederiksberggaed, Copenhagen.)

is damp, or if it is turned in very damp weather, gradually becomes a mouldy one. Such barley is termed "unhealthy," and is of no use for malting. The germination percentage of the barley decreases as the smell becomes stronger.

Evenness and Good Cleaning.

As the new pure-bred kinds of "Prentice" barley (Tystofte, Lyngby, Abed, and Svalöf) have become more widely known, more progress has been made in the pure breeding of choice varieties. Nevertheless, the importance of obtaining absolutely pure-bred barley and of keeping it pure is not as generally recognised as it should be. Purity is one of the essentials for good malting barley, inasmuch as perfect uniformity in the size, shape, content, germination percentage and entire character of the corn is necessary to ensure the best malting results, and consequently, the most satisfactory quality of beer.

Shape of the Corn.

The shape of the corn plays an important part in the judging of malting barley, and experience has shown that very definite conclusions in regard to quality can be shown from it; e.g., short, chubby corns modify much more readily than long slender ones. The farmer should, therefore, take pains to raise a kind of barley possessing characteristics of the former. From this point of view, pure-bred "Prentice" barley may be said to fully satisfy the requirements of the brewer, provided, of course, that the barley is otherwise normally developed and properly handled. It is to be observed, however, that six-rowed barley does not develop such a chubby corn as two-rowed.

Colour.

Malting barley should, before all else, be of uniform colour. Unevenness in this respect is also an index to a lack of uniformity in other qualities, which renders it unsuitable for malting. The colour should preferably be light yellow, such as is found with normally developed and well harvested "Prentice" barley. On the other hand, the corn should, under no circumstances, be bluish-grey, brownish, or brown-tipped. The greyish colour indicates that the barley has suffered to an extent from rain during harvesting. The barley is liable to become brownish in colour when it has gone "hot" after harvesting, i.e., when it has been carted in before it was perfectly dry; or when it has lain on the floor of a loft through which ammonia fumes passed from a stable beneath. Barley should, therefore, never be stored in a stable loft unless the floor is absolutely air-tight and there is no opening in the floor communicating with the stable. The brown tips which often appear on the corns after much rain during ripening and harvesting time seem to have

some connection with attacks of "leaf-spot," which may, to some extent, be prevented by treating the seed as described on page 137.

Nitrogen Content. The nitrogen in malting barley should be low, since a high nitrogen content indicates a low percentage of starch, and because experience has shown that a highly nitrogenous barley always produces a beer with a short life; and if this disadvantage is to be obviated the barley will require very careful treatment during malting. Further, barley with a high nitrogen content is more liable to be injured during storage than one low in nitrogen, and this result is very marked as far as the germination percentage is concerned. The percentage of nitrogen is due partly to the variety of barley and partly to the nature of the soil and to the manuring. "Prentice" barley has usually a satisfactory percentage of nitrogen, seldom amounting to more than 1·60 to 1·75 per cent., calculated on dry matter. A barley with a high yield has generally a somewhat higher nitrogen percentage than one with a low yield. This is associated with the fact that the nitrogenous manures (e.g., potassium nitrate, sulphate of ammonia, cattle urine, etc.) result in a strong growth and a relatively high absorption of nitrogenous food. As a rule, therefore, phosphoric acid (and under certain circumstances, potash) should be used with a limited amount of nitrogenous manures. (See page 134).

Bushel Weight. The weight of dry malting barley should be 53·4 to 55·6 lbs. per bushel (*cf.* tables of the Berlin Control Commission, 1899). A lower weight indicates that the barley is deficient in quality, or with too high a percentage of moisture. A higher weight is frequently obtained by threshing too closely, and also by the excessive application of nitrogenous manures, the latter method producing a steely barley with a high nitrogen percentage. Both methods considerably decrease the value of barley.

Six-rowed barley should weigh from 52·0 to 54·2 lbs. per bushel.

The Skin of the Corn. Good malting barley should have a thin, fine and slightly crinkled skin, which should fit tightly round both ends of the corn and be uninjured throughout its entire length. It is of special importance that the skin be not frayed at the base of the corn, since this is evidence of the fact that the barley has been harvested in poor condition, and that it received somewhat rough handling during threshing.

The finest crinkled surface is to be found on the skin of the corns of normally developed and well harvested "Prentice" barley.

ROYAL COLLEGE OF SCIENCE FOR IRELAND.

*** *Under this general title a series of short articles dealing with the work of the Royal College of Science will be published in this* JOURNAL. *The first and second articles of the series appear below.*

I.—FACULTY OF APPLIED CHEMISTRY.

By GILBERT T. MORGAN, D.SC., F.I.C., M.R.I.A.

I.—HISTORICAL.

The old Royal College of Science was situated in St. Stephen's Green and housed in the building formerly occupied by its forerunner, the Museum of Irish Industry, an institution founded by the State in 1845, with the object of promoting "industrial science and education and the improvement of mining, metallurgy, and mechanical and chemical manufactures in Ireland." This Museum possessed a staff of professors which included Dr. W. K. Sullivan and Monsieur Gages as teachers of chemistry; and public lectures in science were delivered, chiefly in the evening.

In 1864, a Select Committee of the House of Commons recommended a reorganisation of the State-aid given to science in Ireland, and it was held desirable that a college of science should be established. A Royal Commission, which included Sir Robert Kane, the Director of the Museum, and Professors Frankland, Hofmann, Huxley, and Tyndall, was then appointed to advise as to the constitution and staff of the College. The report of this Commission was issued in 1866 and a Treasury Minute of January, 1867, brought the College of Science into existence with a small Government grant.

In the chemical division, the staff consisted of Dr. W. K. Sullivan, Professor of Chemistry; Mr. R. Galloway, Professor of Applied Chemistry, and Mr. W. Plunkett, Assistant Chemist. From the outset, courses of practical laboratory instruction formed an important and essential part of the College curriculum, a policy which was emphasised in the chemical section by the foundation of two chairs, one in theoretical and the other in practical chemistry. When Dr. Sullivan left the College in 1873 to succeed Sir Robert Kane as President of Queen's College, Cork, the two courses were united in one chair, which was held until 1879 by Professor Galloway, who was then succeeded by Dr. W. N. Hartley.

For more than thirty years the work of the College was pursued in its original home in St. Stephen's Green, but the gradual increase in the number of students, and the rapid development of scientific

ROYAL COLLEGE OF SCIENCE—FACULTY OF APPLIED CHEMISTRY.

Fig. 1—Lecture Theatre.

ROYAL COLLEGE OF SCIENCE—FACULTY OF APPLIED CHEMISTRY.

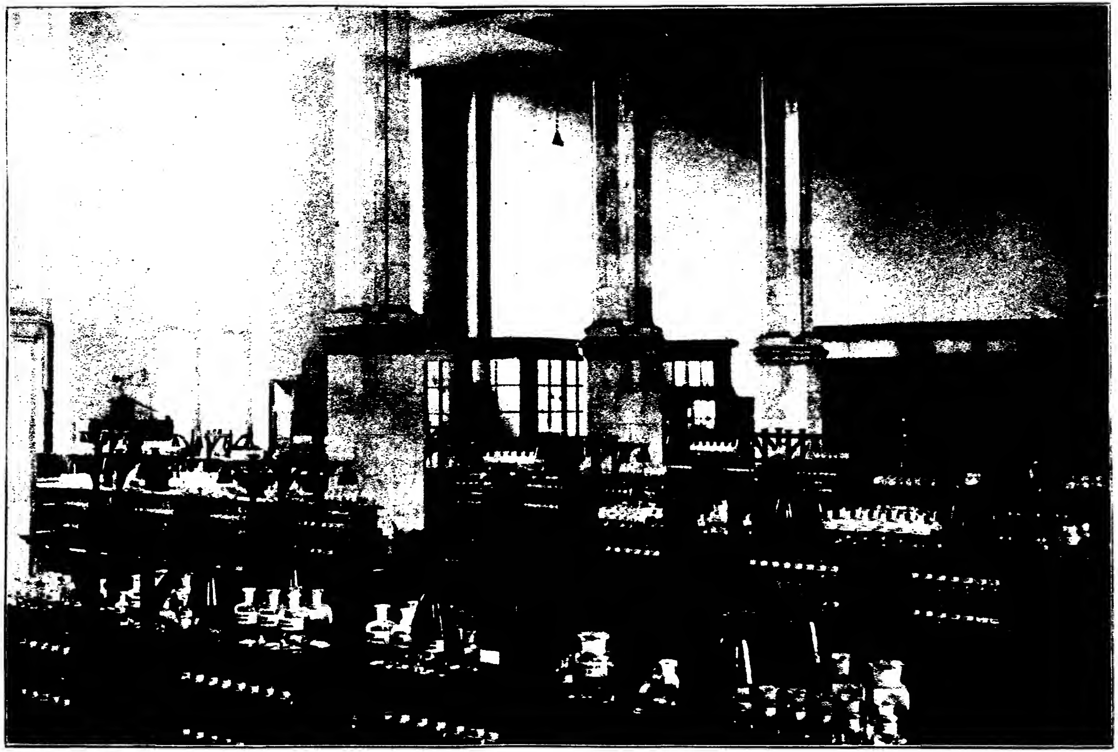


Fig. 2—Main Analytical Laboratory.

and technical education abroad led to a demand for more adequate accommodation as regards space and for considerable extension in equipment and laboratory facilities.

In 1899 a Committee appointed by the Science and Art Department reported favourably on a scheme for the erection of an enlarged college and indicated the site now occupied by the new buildings. The design of the new College buildings was executed by Sir Aston Webb; the foundation-stone was laid by the late King Edward VII. in 1904, and the College was opened formally by His Majesty King George V., on 8th July, 1911.

In 1900 the Royal College of Science was transferred from the administration of the Department of Science and Art to that of the newly-constituted Department of Agriculture and Technical Instruction for Ireland. Two years later an increase in the chemical staff was effected by the creation of a Lectureship in Organic Chemistry. Dr. F. G. Donnan, who was first appointed to this post, was succeeded, on his promotion to the Chair of Physical Chemistry in the University of Liverpool, by Mr. A. O'Farrelly.

In 1911 Sir Walter Hartley retired from the Professorship of Chemistry and was succeeded by Dr. Gilbert T. Morgan, Assistant Professor of Chemistry in the Royal College of Science, London.

A further extension in the direction of applied chemistry was made in 1913 by the promotion to a Lectureship in Physical and Metallurgical Chemistry of Dr. J. H. Pollok, who had for 17 years held the post of Assistant Chemist and Instructor in Assay. In addition to the three senior teachers, the chemical staff includes two assistant demonstrators who take part in the laboratory training of both elementary and advanced students.

II.—Descriptive.

The general principle underlying the courses of instruction in the Faculty of Applied Chemistry is that a thorough and comprehensive knowledge of the phenomena of inorganic, organic and physical chemistry is the surest foundation on which to build the scientific training of students intending to devote themselves to any profession involving the industrial applications of chemical science.

Accordingly all the associate students of the college during their first session work through a course of inorganic and general chemistry, which is supplemented by tutorial work and laboratory instruction.

In the second session chemical students and teachers-in-training in experimental science attend a course of lectures on the principles of organic chemistry which is also attended by the agricultural students. The requisite practical work is carried out during the same session. Having gained an elementary knowledge of both inorganic and organic chemistry the chemical students and teachers-in-training

now proceed to a course of physical and metallurgical chemistry including demonstrations on the use of physico-chemical instruments. Certain of these lectures are attended also by engineering students.

In the third session associate students in chemistry begin to concentrate their attention on this subject and a course of advanced lectures in organic chemistry is given in conjunction with laboratory practice in organic preparations and the methods of organic analysis. A course of lectures in General Chemical Technology given during this session affords a comprehensive survey of the more important industrial applications of chemistry.

Special courses of instruction varying from year to year are given to third and fourth year students on such subjects as metallurgy, spectroscopic analysis, application of the electric furnace, photographic chemistry, and the chemistry of the following arts:—Brewing and fermentation; manufacture of colouring matters; wool, silk, linen, and cotton dyeing; production of synthetic drugs and pharmaceutical products.

In the more elementary stages the laboratory instruction is arranged so as to familiarise students with the nature and uses of the common chemical reagents, and to give them that degree of manipulative skill which is requisite for the effective carrying out of the simpler processes of chemical analysis and synthesis.

Throughout these courses, special attention is paid to neatness, economy, and method in the execution of laboratory work, and advanced students with a favourable record in these respects are allowed, under supervision, to handle modern appliances of chemical research and are given opportunities of performing certain manufacturing operations on a work's laboratory scale.

The ultimate aim of these courses of instruction in Applied Chemistry is to assist students in attaining the scientific qualifications most useful to those wishing to become professional chemists, namely, a sound general knowledge of chemistry in all its most important branches, laboratory habits of precision, economy, and analytical dexterity, an insight into the methods of chemical research and some acquaintance with the factory equivalents of laboratory appliances.

III.—Curriculum for the Diploma in Applied Chemistry.

The courses of study prescribed for Associate Students in the Faculty of Applied Chemistry are designed to extend over a period of four years and although students who have received a suitable preliminary training may be able to complete this work in three sessions,facilities are given them to continue their studies for a fourth year in order to gain greater proficiency in the laboratory arts and in methods of modern chemical research.

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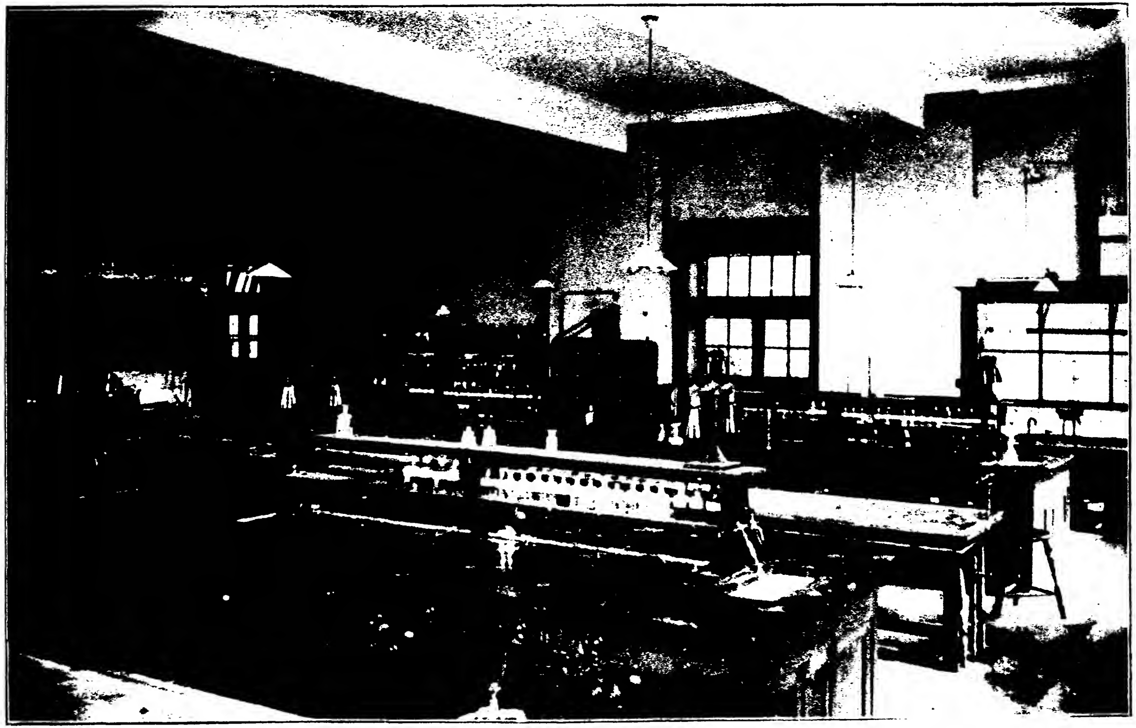

Fig. 3—Organic Laboratory.

ROYAL COLLEGE OF SCIENCE—FACULTY OF APPLIED CHEMISTRY.

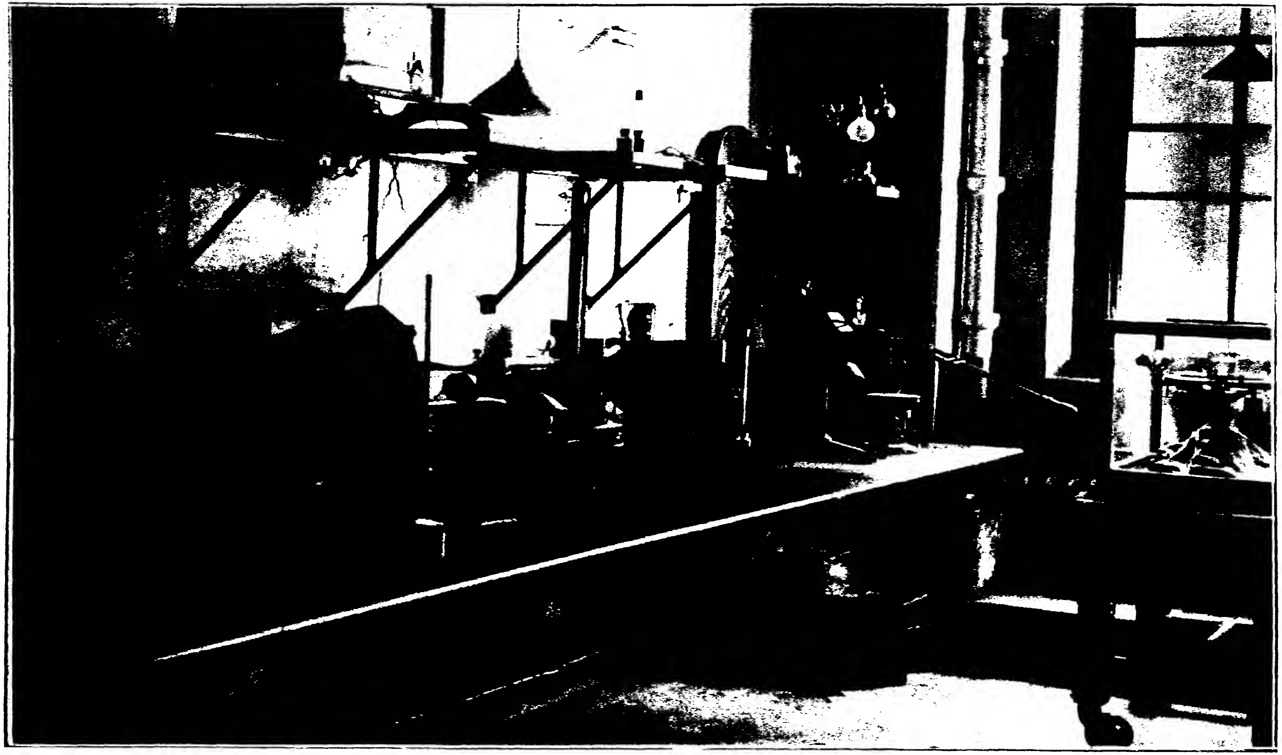

Fig. 4 Spectroscopic Laboratory.

In the first session the work is of an introductory character and at the outset a large proportion of the time is devoted to Mathematics, Physics and Experimental Mechanics, this procedure being adopted because a knowledge of these sciences facilitates considerably the study of General and Inorganic Chemistry which is taken up in the third term. While extending their knowledge of Organic and Physical Chemistry the second year students of the chemical department continue during this session the study of Mathematics, Experimental Mechanics, Drawing, and Descriptive Geometry, in order that they may be able to understand the machinery employed in chemical manufacture, and to make sketches and scale drawings of chemical plant.

In the third session associate students in chemistry concentrate more on their special subject; they attend advanced lectures in inorganic and organic chemistry and chemical technology, while in the laboratory they carry out more difficult exercises in inorganic and organic analysis and synthesis.

The growing importance to chemists of a practical knowledge of the transmission and utilisation of electrical energy has led to the inclusion at this stage of a combined lecture and laboratory course in Electro-technology. A series of lessons in Thermodynamics taken during two terms of the third session affords considerable assistance to chemical students in their study of Physical Chemistry. In the third term two days per week are devoted to lectures and laboratory work in Mineralogy and Petrology with the object of combining the geological and chemical methods of investigating minerals and rocks. A practical course in Applied Bacteriology is given to fourth year students in their second term and with this exception the fourth session is devoted to advanced laboratory work in Inorganic, Physical, and Organic Chemistry. Students who have shown sufficient aptitude in their preliminary studies are encouraged to take up problems requiring original investigation.

IV.—Equipment.

The chemical laboratories have been designed for a two-fold object:—

(1) The thorough instruction in practical chemistry of all students taking chemistry as an introductory subject to other courses.

(2) The special training in laboratory methods and research of students working for the Diploma in the Faculty of Applied Chemistry.

The laboratories, lecture rooms and offices of the Faculty of Applied Chemistry, which occupy the upper ground floor of the main college building, include a large lecture theatre, a smaller

lecture room, three general laboratories, a laboratory of chemical technology and a number of smaller laboratories for special purposes and research.

Lecture Theatres and Preparation Rooms.

The large lecture theatre has a seating accommodation for about 200 persons, and is used not only for the larger classes in chemistry but also for conferences and public lectures. For the latter purpose it is equipped with a large long-focus projection arc-lantern with automatic feed by Zeiss. There is also a smaller lantern for teaching purposes. The lecture table is fitted with water, gas, and electric current, so that the lectures can be fully illustrated by experiments. An adjacent suite of rooms is devoted to lecture preparations and to the storage of apparatus and specimens illustrating important branches of industrial chemistry. It is hoped that these materials will form the nucleus of a teaching collection in chemical technology. Some of these specimens have been prepared in the lecture department, others have been obtained by purchase, whilst a valuable collection of technical products have been presented by various British and foreign firms. These specimens serve to illustrate the special course on chemical technology and a judicious selection of samples is introduced even into the elementary lectures in which some attention is devoted to the practical applications of the leading chemical principles. The chemistry of nitrogen, phosphorus, and potassium leads naturally to a consideration of nitrogenous, phosphatic and potash fertilisers. The properties of gases serve as an introduction to the use of gaseous fuels and the modern plant for liquefying air, carbon dioxide and ammonia.

The smaller lecture room is used for advanced classes in organic and physical chemistry. A large assortment of diagrams employed in the chemical lectures is stored in an adjacent room.

The General Laboratory.

There are three general laboratories, the largest of which, the inorganic laboratory, is a lofty room 30 feet high by about 70 feet square, capable of accommodating 120 students. Here, in the summer time, the first year students of all faculties having completed introductory courses in mechanics and physics take up the study of practical inorganic chemistry. This laboratory is equipped both for advanced and elementary work and throughout the session it is attended by senior students for special courses and research. In addition, there is another general laboratory for mineral analysis in which advanced courses of analytical chemistry are followed by second and third year students.

The organic laboratory is fitted with working benches and leaden-topped preparation tables. This main organic laboratory

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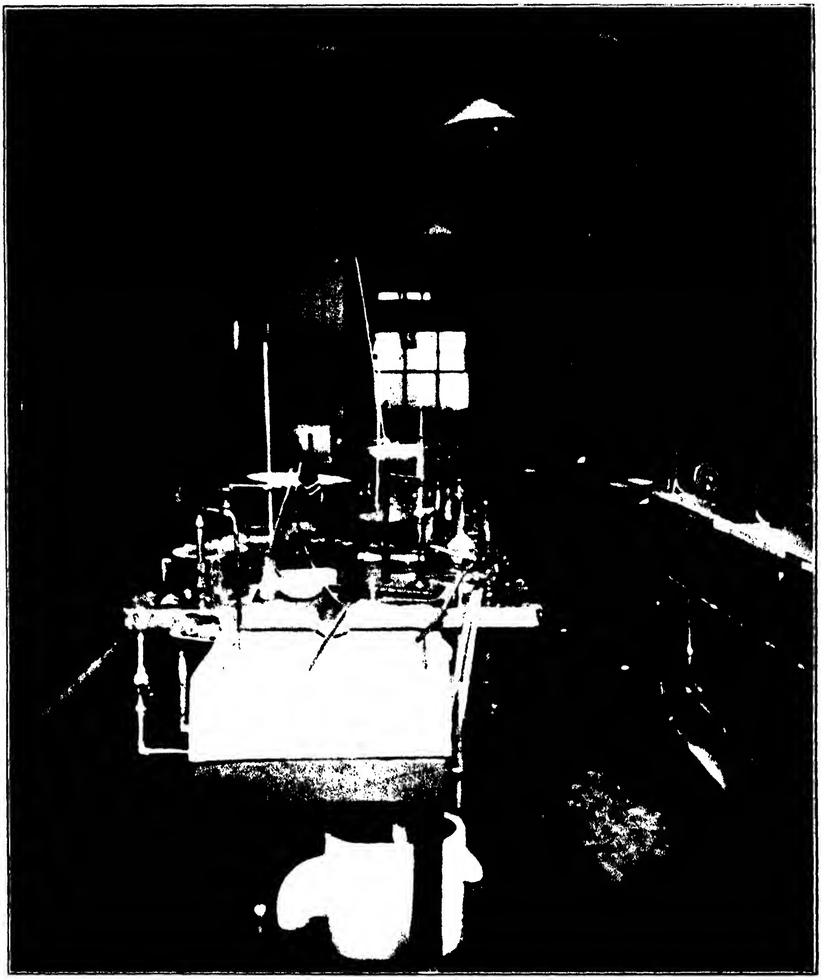

Fig. 5—A Research Laboratory.

ROYAL COLLEGE OF SCIENCE—FACULTY OF APPLIED CHEMISTRY.

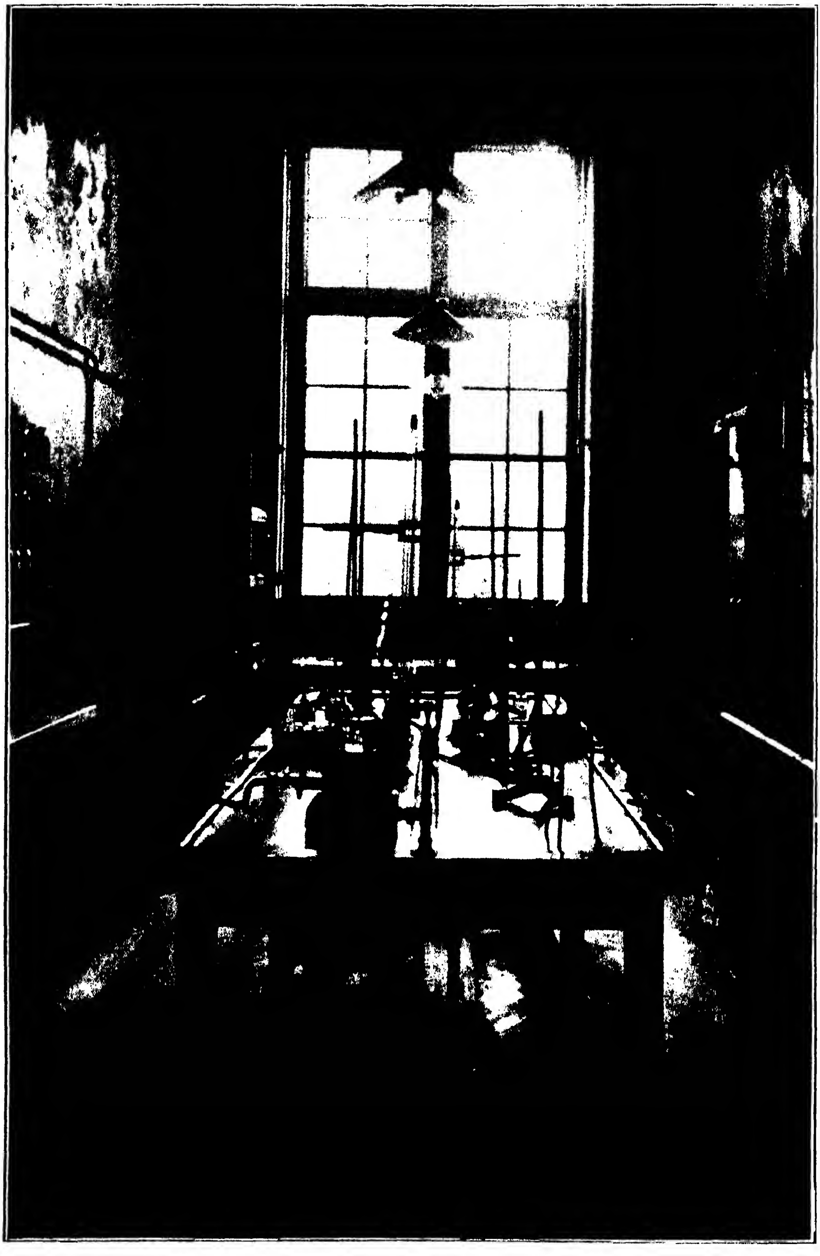

Fig. 6—Professor's Private Laboratory.

is capable of holding sixteen students. Steam is laid on to the preparation tables, and the Fletcher earthenware combustion furnaces and other furnaces for ultimate organic analysis are mounted on a stone bench ventilated with a hood.

These three general laboratories are each fitted with stacks of steam ovens arranged so as to furnish the distilled water required by the workers in these rooms. Two main balance rooms are provided, one adjacent to the analytical laboratory and the other between the mineral analysis and organic laboratories. Although the primary object of these three general laboratories is the general practical training of chemical students yet these rooms are quite serviceable for research purposes, and the original work undertaken by the assistant demonstrators is carried out here, often in collaboration with their senior students.

In addition to the full course in applied chemistry, short summer courses to teachers are given in these laboratories during July, and annually about eighty teachers avail themselves of the facilities offered in the chemical department under the auspices of the Department of Agriculture and Technical Instructon.

Special Laboratories.

In addition to the general laboratories the chemical department includes a number of smaller rooms designed for special purposes and research. The Professor's private laboratory is fitted with working bench, leaden-topped preparation table, and a solid masonry pier for supporting chemical balances and other delicate apparatus. Three other small research laboratories are similarly fitted and a system of vacuum produced by a Lennox rotary pump is laid on to all research laboratories, and also to the lecture tables. For specially high vacua a Gaede pump is provided. Various forms of shaking and stirring apparatus are available for the research laboratories, in all of which electric plugs are conveniently placed for supplying the motive power. These special laboratories are also fitted with steam ovens, steam baths, stone benches, hot plates, and other useful devices. A special room is provided for preparations and analytical processes requiring high pressures. Mounted on a stone bench in this laboratory are four wrought-iron enclosures each containing a sealed tube furnace fitted to the gas mains by metallic connections. Autoclaves for pressure work on a more extensive scale are also fitted up in this room. One laboratory, with two conveniently adjacent dark rooms, is arranged for photographic chemistry, and two others are fitted with apparatus for physico-chemical research.

Pending the installation of a physico-chemical laboratory, the instruction in this important branch of practical chemistry is carried

out partly in the general laboratories and partly in the smaller rooms reserved for special apparatus. The available equipment includes the most modern types of polarimeters, saccharimeters, refractometers, pyrometers, thermostats, calorimeters, apparatus for determining molecular weight by cryoscopic, ebullioscopic and vapour density methods, electrolytic cells for the study of solutions and complete photographic, photometric and metallographic outfits. The chemical department is particularly well equipped with instruments for spectroscopic research, which are fitted up in a special spectroscopic laboratory. This outfit, which includes a portion of the apparatus employed in research by the late Sir Walter Hartley, is sufficiently comprehensive to deal with both visible and ultra-violet spectra and indeed with all possible applications of the spectroscope.

The metallurgical laboratory and assay office are fitted with muffle furnaces, electric furnaces, crucible moulds, sampling apparatus, grinding mills, assay balances, and an outfit for electrolytic analysis with fixed and rotating electrodes. Simple repairs to apparatus and plant can be speedily effected in the wood and metal workshop situated in the basement. Close by is the laboratory of chemical technology in which is being erected a large electric furnace, a reverberatory furnace with a movable experimental hearth, a large drying oven, filter presses, evaporating pans, wooden vats fitted with mechanical stirrers and with inlet and outlet pipes for steam and liquids. Low temperature research is rendered possible by a liquid air plant.

The complete installation of this plant and apparatus will render possible the execution of technical researches in all branches of inorganic and organic chemistry, such, for example, as the extraction of metals, and the production of metallic alloys, bricks, tiles, crucibles, porcelains, glazes, enamels, glass, pigments, paints, drysalts, coal tar derivatives, peat products, synthetic drugs, perfumes, and the essential oils.

Appendix A contains a list arranged in chronological order of the published researches carried out in the Faculty of Applied Chemistry since the opening of college in 1911.

Access to current scientific literature, which is an essential condition for the development of a school of chemical research, is ensured by the college library of 25,000 volumes including the principal publications dealing with chemistry and the allied sciences.

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Fig. 7 Metallurgical Laboratory.

APPENDIX A.

List of Researches and Memoirs published in the Faculty of Applied Chemistry from July, 1911, to the present Time.

"*On the vacuum tube spectra of the vapours of some metals and metallic chlorides.*" Part I.—Cadmium, Zinc, Thallium, Mercury, Tin, Bismuth, Copper, Arsenic, Antimony, and Aluminium. Part II.—Lead, Iron, Manganese, Nickel, Cobalt, Chromium, Barium, Calcium, Strontium, Magnesium, Potassium, Sodium, and Lithium. By James H. Pollok, D.SC., (*Sci. Proc, Royal Dublin Soc.*, 1912, 13, 201 and 252.)

"*On the ultimate lines and the quantities of the elements producing these lines, in spectra of the oxyhydrogen flame and spark.*" By Sir Walter Noel Hartley, F.R.S., and Henry Webster Moss, A.R.C.SC.I., A.I.C. (*Proc. Royal Dublin Soc.*, 1912, 13, 269.)

"*The influence of the chemical constitution of certain organic hydroxyl and aminic derivatives on their germicidal power.*" By Gilbert T. Morgan and E. A. Cooper. (*Proc., 8th International Congress of Applied Chemistry*, 1912, 19, 243.)

"*The constitution of the diazoimines.* Part II.—The *p*-tolyl-β-napthatriazoles." By Gilbert T. Morgan and Frances M. G. Micklethwait. (*Trans. Chem. Soc.*, 1913, 103, 71.)

"*Co-ordination Compounds of Vanadium.*" Part I.—Acetylacetonates. By Gilbert T. Morgan and Henry Webster Moss. (*Trans. Chem. Soc.*, 1913, 103, 78).

"*Non-aromatic diazonium Salts.*" Part I.—Antipyrinediazonium salts and their azo-derivatives. By Gilbert T. Morgan and Joseph Reilly. (*Trans. Chem. Soc.*, 1913, 103, 808.)

"*Influence of Substitution on the reactivity of phenylenediamine.*" By Gilbert T. Morgan and Joseph Allen Pickard. (*Proc. Chem. Soc.*, 1913, 29, 229.)

"*The constitution of the ortho-diazoimines.*" *Part III.—The a- and β-acyl-3: 4-tolylenediazoimines as structural isomerides.* By Gilbert T. Morgan and Frances M. G. Micklethwait, (*Trans. Chem. Soc.*, 1913, 103, 1391.)

"*Non-aromatic diazonium salts.*" *Part II.—Azo-derivatives from antipyrinediazonium salts and their absorption spectra.* By Gilbert T. Morgan and Joseph Reilly. (*Trans. Chem. Soc.*, 1913, 103, 1494.)

"*A refined method of obtaining sublimates.*" By Arnold L. Fletcher. (*Sci. Proc. Royal Dublin Soc.*, 1913, 13, 460.)

"*A method for the determination of radium in radioactive substances.*" By Arnold L. Fletcher. (*Phil. Mag.*, 1913, 26, 674).

"*The fractionation of alloys and minerals in the electric micro-furnace.*" By Arnold L. Fletcher. (*Trans. Chem. Soc.*, 1913, 103 134.)

"*Constitution of the ortho-diazoimines. Part IV.—Isomeric Benzenesulphonyl-*3 : 4-*tolylenediazoimides.*" By Gilbert T. Morgan and Godfrey E. Scharff. (*Trans. Chem. Soc.*, 1914, 104, 117.)

"*Researches on Residual Affinity and Co-ordination.*" *Part I.—Metallic Acetylacetones and their Absorption Spectra.* By Gilbert T. Morgan and Henry W. Moss. (*Trans. Chem. Soc.*, 1914, 105, 189.)

"*Non-aromatic diazonium salts.*" *Part III.*—3 : 5—*Dimethyl-pyrazole-*4-*diazonium salts and their Azo-derivatives.* By Gilbert T. Morgan and Joseph Reilly. (*Trans. Chem. Soc.*, 1914, 105, 435.)

"*Organic Derivatives of Metals and Metalloids.*" By Gilbert T. Morgan. (*Science Progress*, 1914, 32, 690.)

"*Organic Derivatives of Arsenic and Antimony.*" By Gilbert T. Morgan. (*Pharmaceutical Journ.*, 1914, 92, 537 and 567.)

"*Modern Dyes and Dyeing.*" By Gilbert T. Morgan. (*Economic Proc. Royal Dublin Soc.*, 1914, 123.)

"*Diazotisation of Aminomesitylenes.*" By Gilbert T. Morgan and Joseph Reilly. (*Proc. Chem. Soc.*, 1914, 30, 74.)

"*Mercuration of Aromatic Amines.*" By Gilbert T. Morgan and J. Campbell Elliott. (*Proc. Chem. Soc.*, 1914, 30, 186.)

"*Some stereochemical aspects of residual affinity.*" By Gilbert T. Morgan. (*Chemical World*, 1914, 3, 99.)

II.—ELECTRICAL ENGINEERING AND PHYSICS.

By W. Brown, B.Sc., M.I.E.E., M.R.I.A.

The Electrical Engineering and Physics Division of the College, with the exception of one room (belonging to the Chemistry Division), occupies the whole of the lower ground floor, covering over 20,000 sq. feet of floor area, and consists of 30 rooms of various sizes.

This Division has also one room on the ground floor having a window with a southern aspect which is used for spectrometer work ; the equipment of this room includes a large Hilger Spectrometer with objectives 3 inches in diameter, and with a centre divided circle 18 inches in diameter, which is provided with twin microscopes reading to one-sixth of a second. The other accessories include a Rowland Plane diffraction grating with ruled surface 3 by 2 inches, the rulings being 14,438 lines to the inch.

Taking the rooms on the lower ground floor, in order ; beginning at the north-east corner we have the Physics Workshop, where apparatus is made and repaired. This room is furnished very completely with the various tools for working in iron, brass, and wood, and contains a 5-inch Drummond screw-cutting lathe, a 4-inch Buck and Hickman single-gear lathe, a circular saw, etc., all being driven by an electric motor with belting and countershafts. There are also small clockmakers' lathes, and other tools for fine light work, brazing forge, etc. The Photographic Room adjoining the Workshop is furnished with every convenience for photographic work, has double doors, ruby glass windows, six-foot washing trough, and duplicate electric lighting.

First Year's Physics Laboratory.

The First Year Physics Laboratory is a large room 74 feet long and 60 feet wide, and has five large stonework pillars down the middle supporting the floor above ; these pillars are each 4 feet square and have slate slabs built into two sides for holding balances or other apparatus. The other two sides of each pillar are fitted with means of suspending wires and other apparatus for testing purposes, and between the pillars are four vibration-proof floor slabs for supporting reading telescopes, etc. There are ten teak work-benches with presses and drawers each 16 feet long, and 4 feet 6 inches wide, supplied with water, gas and electricity, so that from 80 to 100 students could work in this laboratory at one time. At one end of the room there is a lecture platform and table, a diagram screen and all the accessories required for demonstration purposes. There are also six slate slabs built into the wall between the windows, which are used for galvanometer and other work, three large glazed cases with presses for holding apparatus, fume chambers, hot water, etc. Fig. 1.

Second Year's Physics Laboratory.

The Second Year Physics Laboratory is a room 48 feet long and 24 feet wide, and has four teak wood benches with presses and drawers, each bench is 15 feet long and 4 feet 6 inches wide ; there are also five slate slabs built into the wall, one vibration-proof pedestal and two vibration-proof floor slabs. The benches are supplied with hot and cold water and steam, direct and alternating currents are available at several points ; there are large apparatus cases with presses, blow-pipe table, etc. Fig. 2.

The Third Year Physics Laboratory is 40 feet long and 26 feet wide, and has two teak benches each 14 feet long and 4 feet 6 inches wide, there are also two tables and one slate slab 16 feet long, and two smaller slate slabs built into the wall. There is a vibration-proof pedestal and two vibration-proof floor slabs, blast pump, fume chamber, hot and cold water, and electricity supply. The work in pure physics for Third and Fourth Year students is largely research work so that the apparatus is set up by the student as required.

Physics Lecture Theatre.

The Physics Lecture Theatre has seating accommodation for 112 students and is panelled in natural wood, the lecture table of length practically equal to the width of the room is supplied with hot and cold water, gas, direct and alternating currents, and other accessories. The Preparation Room adjoining and opening off the Lecture Theatre is fitted with all that is required for the preparation, testing, and repairing of lecture apparatus. From the Preparation Room a spiral stair-case leads to the Diagram and Store Room above, from which diagrams may be lowered through a concealed opening, so that they hang above the black-boards in the Lecture Theatre. Close to and opening off the Preparation Room as well as off the corridor is a large room, lined with glass cases and presses, for storing the apparatus used in the lectures.

High Tension Electricity Room.

The High Tension Electricity Room is 25 feet square, and has one teak table 15 feet long and 4 feet 6 inches wide, one slate bench 10 feet long, two vibration-proof pedestals and floor slabs, and is supplied with water, gas, direct current, single phase, and three-phase alternating current. This room is used for high-pressure electrical work only, the equipment includes two Tesla sets, sets of induction coils, and particularly a Snook High Tension apparatus. Fig. 3.

The Snook Apparatus, made by Messrs. Newton of London, consists of an 8 H.P. three-phase 346 volt. induction motor, coupled direct to a 4 K.W. self-exciting 140 volt. 46 frequency single-phase generator. The alternating current from the latter machine is trans-

ROYAL COLLEGE OF SCIENCE—ELECTRICAL ENGINEERING AND PHYSICS.

Fig 1.—First Year Physics Laboratory.

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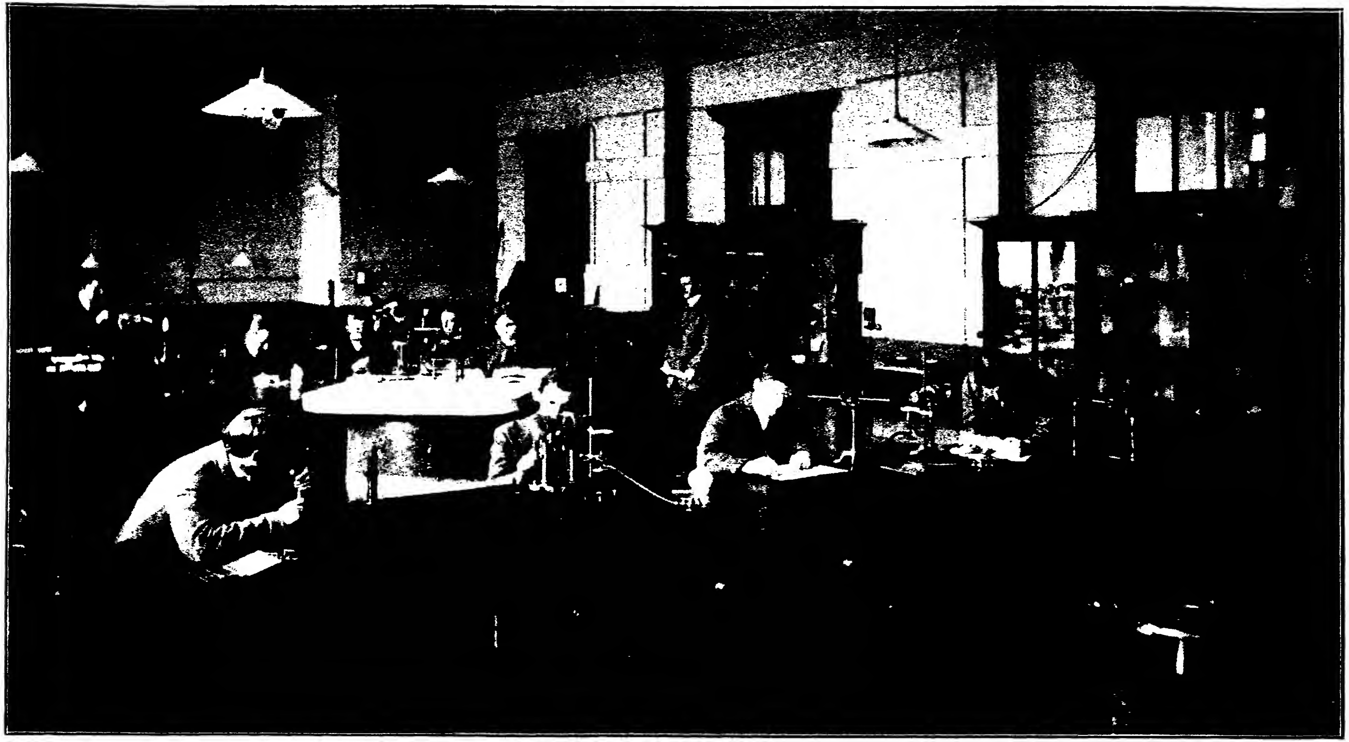

Fig. 2.—Second Year Physics Laboratory.

formed up to a high voltage by means of an oil-immersed static transformer and then rectified by means of a high tension reversing switch, which latter being mounted on an extension of the generator shaft automatically reverses the connections to the spark gap when the voltage is zero. The spark gap which is of the point and disc type has a maximum separation of 10 inches, and represents a sparking potential of approximately 120,000 virtual volts. A detachable coupling is provided between the generator and reversing switch which allows either uni-directional or alternating high tension current to be delivered to the spark gap.

The voltage is controlled by means of a portable switch panel; the rough adjustment being obtained by inserting resistance in series with the transformer, and the fine adjustment by means of five tappings from the primary of the transformer. A milliameter with two ranges reading to 6 or 60 milliamperes indicates the strength of the high tension current.

The Electro-Technical Drawing Office contains 12 draughtsman's tables, each table is supplied with an electric lamp supported on a flexible arm, and the table top is in the form of a desk for holding the students' drawing apparatus. There is a black-board 23 feet long which is very suitable for the teaching of electrical machine design, and on which a student, if necessary, may draw any special part of a machine full size so as to get an idea of his design. This room is used by both third and fourth year students in Electro-technology, the third year students design and draw some one type of direct current machine, and the fourth year students design and draw some type of alternating current machine. The room is also furnished with large glass cases and presses for storing of drawings, etc.

The Switches Room.

The Switches Room contains the switchboards for controlling and distributing the current from the large storage battery to the rooms on the different floors of the College, and also distributing boards for supplying single phase alternating current at three different voltages to the various rooms on the lower ground floor. There are also the switchboard panels for controlling the charging and discharging of the storage battery, and the charging set, which latter consists of a 27 H.P. three phase induction motor driven from the city mains at 346 volts, and is coupled direct to two continuous current dynamos arranged in tandem, each giving 110 volts. One machine acts as a booster when charging the cells, and when the battery is off the machines may be put in parallel for supplying current to the mains direct.

The Heat and Electric Furnace Room has a smooth stone floor, a teak table 15 feet long and 4 feet 6 inches wide, a stone bench

14 feet long equipped with large gas connections and glazed brick-work extending 4 feet up the wall; there is a metal hood over one end of this bench with exhaust flue. There is also the usual gas and water supply, direct current, and alternating current.

The Electro-magnetism Room is 28 feet long by 12 feet wide and is used solely for testing the magnetic properties of iron and the other magnetic metals. There are two slate slabs supported on glazed brick pillars, three slate slabs built into the wall, with the usual supply of gas and electric current both direct and alternating. The equipment of this room includes a Ewing bridge and Ewing Yoke, and apparatus for testing magnetic materials by the magneto-metric, and ballistic methods.

The Electro-technical Lecture-Room, which is used for third and fourth year work, has seating accommodation for 32 students, and has all the usual accessories of a lecture room, viz., lantern, screen, black-board, water, gas and direct and alternating current, etc.

The Apparatus Room and the end of the corridor are lined with glass cases and presses, which hold the apparatus, samples, etc., used in the lectures.

Electro-Technical Laboratory.

The principal Electro-Technical Laboratory, which contains the dynamo machines for teaching purposes, is situated at the south-east corner of the lower ground floor of the College. It consists of a large room 62 feet long and 60 feet wide, which has four large cylindrical pillars two feet in diameter down the middle, serving as the support for the floor above, and between three of these pillars the switchboard panels are placed, and thus divide the large room into the Third Year Laboratory on the north side and the Fourth Year Laboratory on the south side.

The switchboard panels are made of white marble slabs 6 feet high, and are placed back to back with a space of about 3 feet between them so as to enable students to examine the connections. Each panel has the usual accessories of main terminals, main switch, fuses, voltmeter, and starter or regulator, the switches being made specially massive and strong so as to stand the tear and wear of students' work. The whole switchboard extends to about 45 feet including the two narrow doors which give access to the back of the panels. The machines are built up on white glazed brick foundations varying from 4 inches to 18 inches in height, and are arranged in two parallel rows, one in each laboratory; the wiring between the panels and machines being laid in easily accessible covered trenches in the floor.

The machines and panels are clearly numbered so that the students can easily trace the connections between each machine and its corresponding panel.

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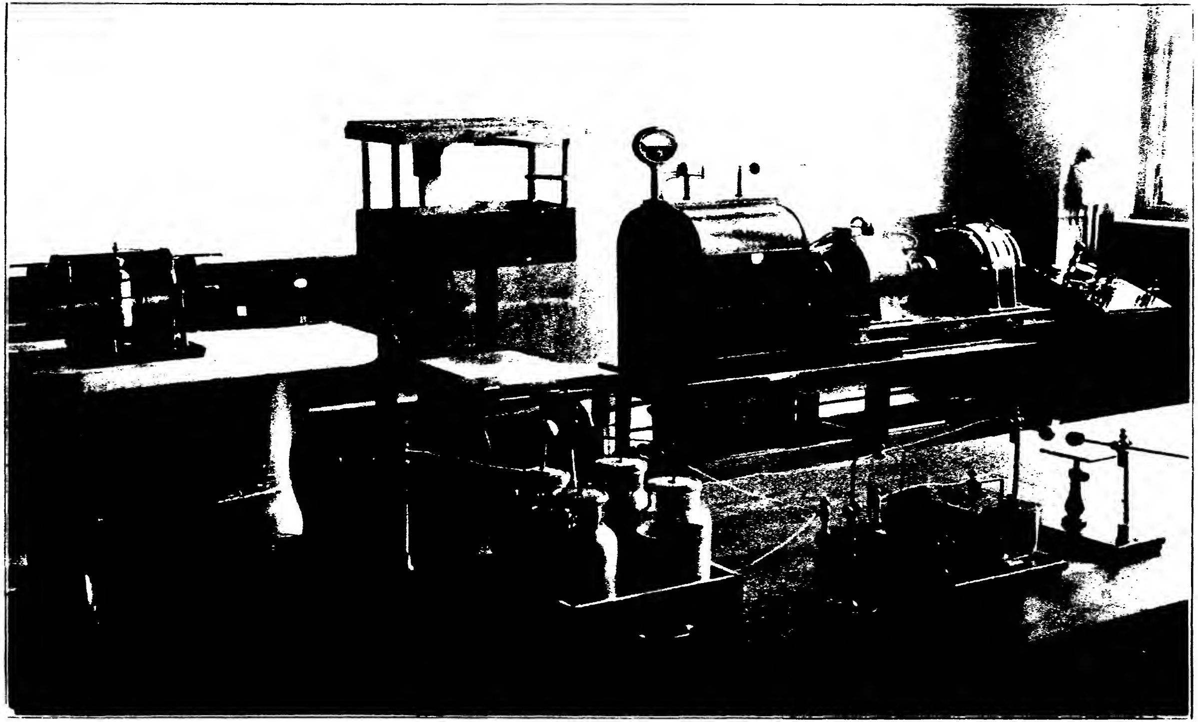

Fig. 3.—High Tension Electricity Room.
(The Snook Apparatus).

ROYAL COLLEGE OF SCIENCE—ELECTRICAL ENGINEERING AND PHYSICS.

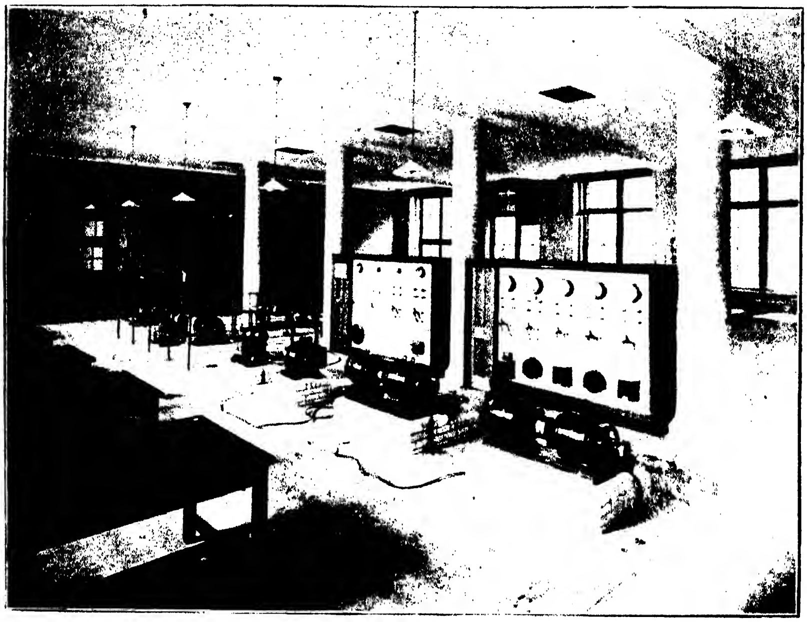

Fig. 4.—Third Year Electro-Technical Laboratory.

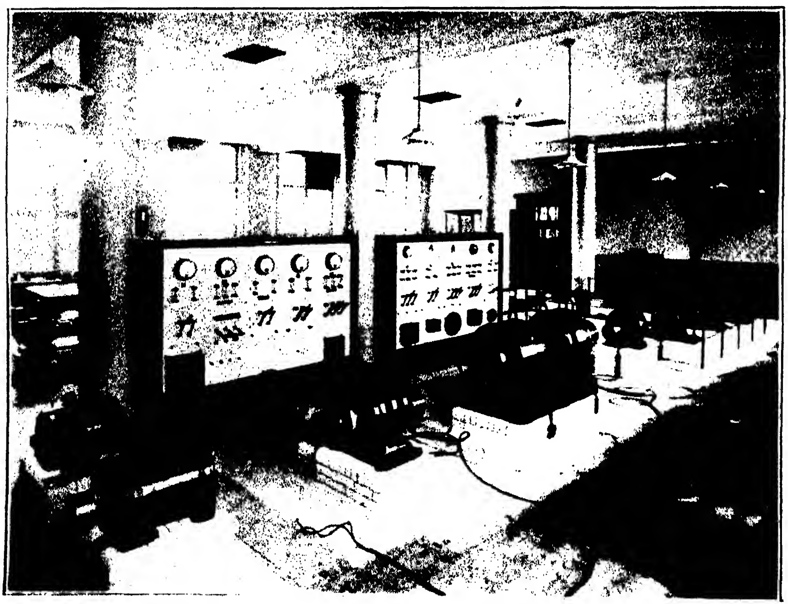

Fig. 5.—Fourth Year Electro-Technical Laboratory.

The machines are numbered 1 to 9 in the third year laboratory and 10 to 18 in the fourth year laboratory.

Taking the machines in the order in which they are numbered, we have :— Fig. 4.

No. 1 is a Brush Co.'s 6-pole single phase alternator with revolving armature, output 3·75 K.W. at 100 volts, 50 periods per second, 1,000 r.p.m. and is belt driven, field excited from a 100 volts secondary battery.

No. 2 is a Newton 2-pole direct current dynamo which can be used as a series, shunt or compound wound machine, output 3·75 K.W. at 100 volts, 1,270 r.p.m. and is belt driven.

No. 3 is also a Newton direct current machine (Mawdsley's Patent) of output 4·75 K.W. at 135 volts, 1,100 r.p.m. This machine is used for the direct current side of the Rotary Converter No. 15, as well as for the usual tests.

No. 4 is a Newton 2-pole direct current motor which can be used as a series, shunt, or compound wound machine. The output is about 3 B.H.P. at 100 volts, 1,100 r.p.m., and has a pulley for brake tests or for driving another machine.

No. 5 is a British Thomson-Houston 100 volt, 4-pole direct current series wound motor, with a 6-step diverter. Output 5 B.H.P.; 1,050 r.p.m. Brake pulley water-cooled, and has a coupling on end of shaft for a magnetic brake.

No. 6 is a Westinghouse 4-pole single phase alternator, with revolving armature. The output varies :—

From 1·2 K.W., at 40 volts, period 20 per second, at a speed of 600 r.p.m.

To 8 K.W., at 100 volts, period 50 per second, at a speed of 1,500 r.p.m.

With 23 intermediate steps between the periods 20 and 50 per second.

This machine is coupled direct to machine No. 7.

No. 7 is a Westinghouse 100 volt, 4-pole direct current shunt wound motor, output 4 B.H.P. It has a regulator which can vary the speed from 600 to 1,500 r.p.m. with 23 intermediate steps.

This set, Nos. 6 and 7, is for giving alternating currents of various frequencies for testing iron, chokers, transformers, etc., and for any other tests that require alternating currents of different frequencies.

Nos. 8 and 9 are two exactly similar Westinghouse compound wound 4 pole direct current machines coupled together, output 5 K.W. each, 100 volts, 1,300 r.p.m. A coupling at one end for magnetic brake. This set is for the Hopkinson and other tests. Fig. 5.

No. 10 is a Siemens alternating current single phase repulsion motor, 5 B.H.P., 100 volts, 50 periods per second, power factor 0·88 speed from 750 to 1,500 r.p.m. This machine is provided with a water-cooled brake pulley, which can be removed and a magnetic brake coupling put on its place. The small panel for this machine is on the wall beside the 100 volt, alternating current supply.

No. 11 is a Bruce Peebles split-pole converter. It has two windings on the one armature core ; with a commutator at each end. There are 8 poles (4 motor poles and 4 generator poles). Motor side takes 100 Volts and 55 amperes : Generator side gives 220 volts and 20 amperes. Potential regulator in generator field circuit, speed 1,000 r.p.m.

No. 12 is a Bruce Peebles, 3-phase, 10 H.P. induction motor, 346 volts, 50 periods per second, and speed of 1,440 r.p.m. Slip rings with rheostat in rotor circuit. Water-cooled brake pulley, and coupling for attaching magnetic brake.

Alongside of this machine there is a portable three phase transformer, 346 Volts primary, and the secondary giving 3-phase voltages from 300 to 40 volts in 8 steps.

By means of this transformer the induction motor can be driven at 9 different voltages, so as to obtain data for performance curves.

On this No. 12 panel is a double throw three-pole switch, which when put up connects the 346 volts on to the motor, and when put down connects the 346 volts, three phase supply on to the transformer primaries and so produce the various secondary voltages for the motor.

This three phase transformer can also be used for many other laboratory tests.

Between panels 12 and 13 is the secondary battery panel where from 60 to 120 amperes at 110 volts are available from a battery of 61 Tudor cells situated in the vaults outside the main building. This battery is sometimes used for motors, and for exciting the alternator field coils, but mainly for experiments where a perfectly steady E.M.F. is essential.

If all the direct current motors were going at full load at the same time they would require a total current of some 250 amperes which would be too much for the battery, so in order to save the battery from excessive work, a motor-dynamo set Nos. 13 and 14, was installed, which converts the 3-phase alternating current city supply to direct current for driving the motors, as well as for experiments requiring a fairly large current.

No. 13 is a Bruce Peebles 30 K.W. 4-pole (and with 2 commutator poles) compound wound, direct current dynamo, with an output of 273 amps. at 100 volts. Speed 960 r.p.m.

ROYAL COLLEGE OF SCIENCE—ELECTRICAL ENGINEERING AND PHYSICS.

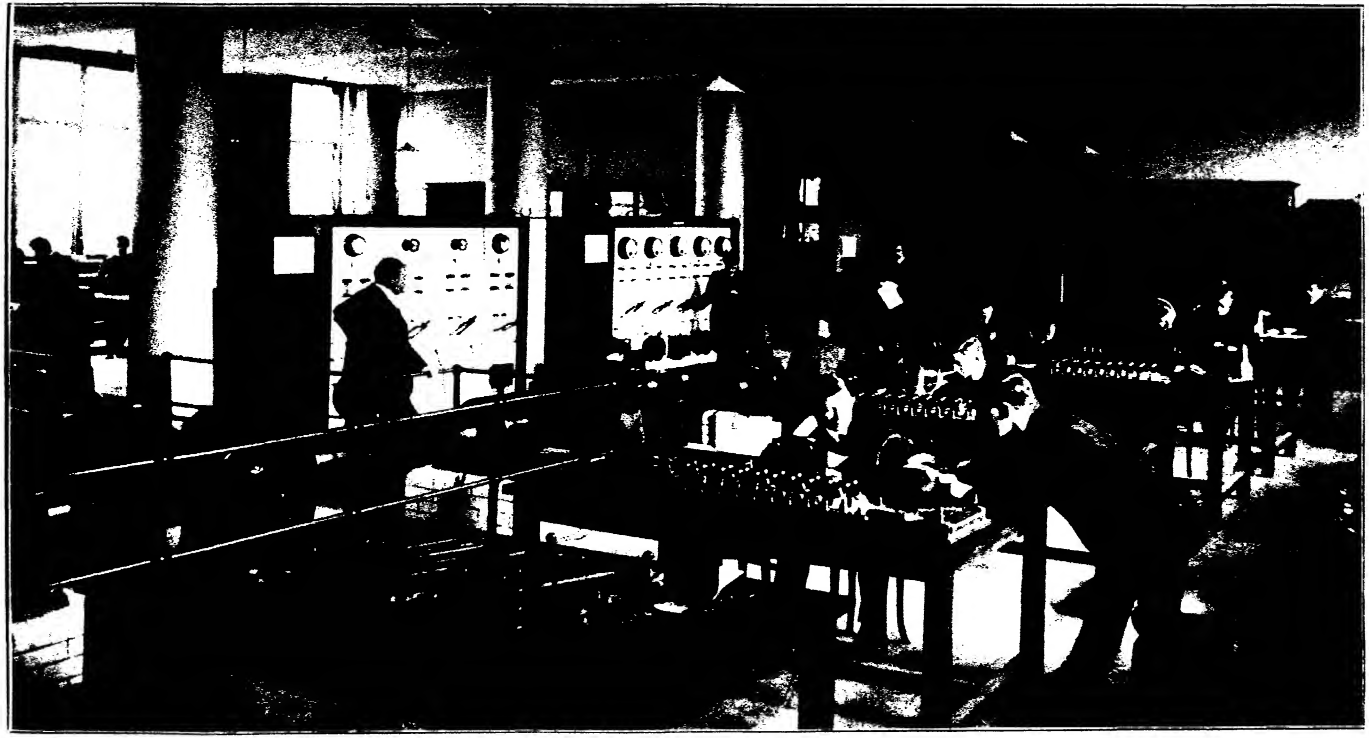

Fig. 6.—Third and Fourth Year Electro-Technical Laboratories.

The shunt rheostat is finely divided so as to keep the E.M.F. constant for driving the motors, etc. This is direct coupled to No. 14.

No. 14 is a Bruce Peebles 46 H.P. 3-phase, induction motor, 346 volts, 50 periods per second, and at speed 960 r.p.m. Slip rings, with starting rheostat in the rotor circuit, and short circuiting gear.

No. 15 is a General Electric Co.'s 6-pole, 3-phase, 4 K.W. Rotary converter, the direct current side takes 135 volts and 30 amperes from machine No. 3, the alternating side giving 80 Volts 3 phase. Or the 3-phase side takes 80 volts from Machine No. 16, the direct current side giving 135 volts.

In the usual way the Rotary is started up on the direct current side from Machine No. 3 then synchronised, and Machine No. 16 put on the 3-phase side.

Instead of getting the 3-phase current for the Rotary from Machine No. 16 there are three single-phase transformers of 4 K.W. each whose primaries take 346 volts from the mains and secondaries give 80 volts, 3-phase which can be used on the Rotary.

The Rotary has a pulley for brake tests or for driving another machine.

No. 16 is a Brush Co.'s 3-phase generator 3·75 K.W. with stationary armature and 6 revolving poles, 80 volts (which suit the 3-phase side of No. 15), 50 periods per second, and speed 1,000 r.p.m.

This machine is used for all kinds of 3-phase testing as well as for the Rotary.

No. 17 is a General Electric Co.'s 15 H.P. 3-phase induction motor, with slip rings, and starting rheostat in rotor circuit, 346 volts. 50 periods per second, and speed 950 r.p.m.

This machine, No. 17, by means of belts and countershaft, drives the machines numbered 1, 2, 3, 16 and 18.

No. 18 is a Bergmann, 6-pole direct current dynamo 6·6 K.W., 110 volts, 250 r.p.m. and can be used as a series, shunt, or compound wound machine.

It was formerly (in the old College) coupled direct to a gas engine, but has been modified to suit belt driving. Fig. 6.

As well as these fixed machines there are several portable small dynamos and motors, varying in capacity from ½ to 3 K.W., which are used for general testing purposes.

At various points in the laboratory there are available direct currents at 110 volts, single phase alternating current at 50, 100, and 200 volts, and three-phase current at 346 volts from the city mains.

The general testing accessories in these laboratories include :—
A Magnetic Brake for testing efficiencies and obtaining performance curves of electric motors. In this type of brake the power is absorbed in the production of eddy currents in revolving copper discs, the balance on load being obtained by means of a weight on a graduated lever arm.

A Hot-wire Oscillograph capable of indicating simultaneously current and E.M.F. wave forms on inductive and condensive circuits, etc., and includes among its accessories a tracing outfit and an instantaneous camera for photographing the wave forms.

A Crompton Potentiometer for measuring E.M.F. current and power in direct current circuits.

A Kelvin combined ammeter and voltmeter set of range 0 to 600 volts and 0 to 750 amperes, this instrument is mostly used for standardising and for accurate measurements.

An Elliott Bros. Century Works triple alternating current testing set, consisting of combined ammeter, voltmeter, Wattmeter, and a set of transformers, the ranges are 0 to 100 amperes 0 to 660 volts, and up to 66 kilowatts.

A Kelvin Electric standard balance. Four portable sets for testing insulation. Various types of portable Wattmeters, recording ammeters and voltmeters, Frequency meter, numerous portable ammeters and voltmeters of different types.

Three large anti-inductive resistance frames capable of carrying from 5 to 80 amperes each by 11 steps, these are mainly used in 3-phase work, that is, testing machines, etc.

There are numerous portable liquid rheostats, and portable lamp and wire rheostats.

There are 13 teak tables fitted with drawers and presses, 15 portable teak tables each 6 feet long and 4 feet 6 inches wide, and 8 slate slabs fixed in the wall ; also three large glass cases with presses for storing apparatus.

The next room is the Winding and Repairing Shop, a room 45 feet by 25 feet and contains tables and benches fixed round the wall and against the pillars ; it is supplied with water, gas, direct current and alternating current. The benches are allocated for woodwork, brass and iron work, soldering, brazing, etc. Two small lathes are available for bobbin winding and other purposes, there are two large presses for tools, etc. Adjoining this room is a large store and unpacking room which contains water, gas, and other conveniences.

The accommodation for the teaching staff consists of the Professor's room and private laboratory, Lecturer's room, and three rooms for the three Demonstrators, all these rooms are inter-

connected by telephone, and are each provided with benches and tables, which are supplied with water, gas, and electricity, both alternating and direct current, so as to enable private research to be carried on independently of the ordinary routine work of the College.

Coming now to the vaults outside the main College building, we have two switch rooms called the North and South Switch Room, respectively. Each of these rooms supplies about half of the electric lighting and power for the College building proper and also for the Mechanical Engineering building outside. The Corporation electrical supply enters each room through main fuses and energy meters, into transformers which reduce the pressure from 200 to 100 volts for lighting. From the South Switch Room comes the three-phase electric power for the Electro-Technical laboratory as well as the single phase alternating current for the various rooms in this Division. The North Switch Room supplies the three-phase power for the electrical plant in the Chemistry and Mechanical Engineering Divisions.

The Storage Battery Room contains 61 cells of total capacity 288 ampere-hours, the normal rate of discharge being 96 amperes at 110 volts, for three hours. From this battery direct current at 110 volts, is supplied to the various rooms on each of the four floors of the College for lantern work and experimental purposes.

The numerous portable secondary cells are taken to the Portable Battery Charging Room at the end of each week to be charged. The charging set consists of a 3·5 K.W. three-phase induction motor 346 volts, coupled direct to a continuous current dynamo giving 110 volts; there is a bench round two sides of the room having charging terminals, and a white marble switch panel mounted with all the accessories for controlling the charging current.

The Electric Lamp Testing Room is 50 feet long and 12 feet wide, with the walls and ceiling painted a dead black, and with black blinds on the windows. A teak bench runs along one side and one end of the room, and is furnished with an adequate supply of electricity, both direct and alternating current. There is also the usual accommodation for storing the apparatus used in testing.

It will be evident, therefore, that this Division of the College, with its 80 rooms and floor area of over 20,000 sq. feet, is exceedingly well equipped, and students have an excellent opportunity of being thoroughly trained for the profession of Electrical Engineering.

[APPENDIX.

APPENDIX.

List of Papers Published by Members of the Staff in the Electrical Engineering and Physics Division of the College, during the past Five Years.

"*Mechanical Stress and Magnetisation of Iron.*" Part I. By Prof. Brown. (*Scient. Proc. Roy, Dub. Soc.*, May, 1909. Vol. XII., No. 12.)

"*Mechanical Stress and Magnetisation of Iron.*" Part II. By Prof. Brown. (*Scient. Proc. Roy. Dub. Soc.*, June, 1909. Vol. XII., No. 17.)

"*Chairman's Address to the Dublin Local Section of the Institute of Electrical Engineers.*" By Prof. Brown. (*Journal of the Institute*, November, 1909. Part 199 ; Vol. 44.)

"*Permanent Steel Magnets.*" By Prof. Brown. (*Scient. Proc. Roy. Dub. Soc.*, February, 1910. Vol. XII., No. 26.)

"*Chrome Steel Permanent Magnets.*" By Prof. Brown. (*Scient. Proc. Roy. Dub. Soc.*, April, 1910. Vol. XII., No. 29.)

"*Improvements in Receiving Apparatus for Electric Telegraphs and Electric Selective Systems.*" By Wm. J. Lyons. May, 1912. British Patent Complete Specification, No. 10911/12. Patents granted in Great Britain, United States of America, France, Germany, Italy, Spain.

"*A Method of exact determination of the continuous change in Absolute Density of a Substance, e.g., Wax in passing through its Fusion Stage.*" By Wm. J. Lyons, (*Scient. Proc. Roy. Dub. Soc.* Vol. XIII. (N.S.), No. 5. May, 1911.)

"*On the distribution of Mean Annual Rainfall and Average Number of Rain Days per year over an area including the Counties of Dublin, Wicklow, Kildare, and Meath : A Study in local variation of Rainfall.*" By Wm. J. Lyons. (*Scient. Proc. Roy. Dub. Soc.* Vol. XII. (N.S.), No. 30. May, 1910.)

"*Mechanical Stress and Magnetisation of Iron.*" Part III. By Prof. Brown. (*Scient. Proc. Roy. Dub. Soc.*, September, 1910. Vol. XII., No. 36.)

"*Resonance and Magnetic Rotation Spectra of Sodium Vapour. Photographed with the Concave Grating.*" By. Prof. R. W. Wood and Felix E. Hackett. (*Astrophys. Journal*, No. 30. 1909.)

"*Mechanical Stress and Magnetisation of Nickel.*" Part I. By Prof. Brown. (*Scient. Proc. Roy. Dub. Soc.*, December, 1910. Vol. XII., No. 37.)

"*Mechanical Stress and Magnetisation of Nickel.*" Part II. By Prof. Brown. (*Scient. Proc. Roy. Dub. Soc.*, April, 1911. Vol. XIII., No. 3.)

"*Improvements in Electric Telegraph Receiving Apparatus of the Selective Type.*" By Wm. J. Lyons. British Patent Complete Specification. No. 15097/13. June, 1913.

"*Clare Island Survey. Part VI.—Climatology.*" By Wm. J. Lyons. (*Proc. Royal Irish Academy.* Vol. XXXI. February, 1914.)

"*The Subsidence of Torsonial Oscillations in Nickel Wires in Alternating Magnetic Fields.*" By Prof. Brown and Mr. J. Smith. (*Scient. Proc. Roy. Dub. Soc.*, February, 1914. Vol. XIV., No. 14.)

"*Change of Length in Nickel Wire in Alternating Magnetic Fields.*" By Prof. Brown. (*Scient. Proc. Roy. Dub. Soc.*, May, 1914. Vol. XIV., No. 21.)

WAR AND FLAX GROWING.

FLAX SEED FOR 1915 SOWING.

The attention of farmers is directed to the fact that there is every likelihood of flax realising high prices next year, and that this crop is, therefore, likely to prove remunerative. Owing to the war there may be difficulty, however, in getting seed. The Department have made inquiries in various quarters, and they find that no dependence can be placed on any new source of supply.

Reports show that sowings in Russia in 1914 were less than those of the previous year; and that, moreover, the crop is not a good one, the yield of seed being much below the normal. In Holland the sowing in 1914 is reported to have been considerably less than in 1913; the seed, however, has been harvested in good condition.

In previous years the Department have urged upon farmers the desirability of placing their orders for flax seed early in the season, so as to give seed importers an opportunity of securing the best. *This year, however, the placing of orders at once becomes an absolute necessity* if the farmer is to make sure of obtaining seed. As pointed out above, the quantity is limited, and it must be borne in mind that there are other competitors seeking for it. It is by no means certain that seed in any quantity can be got from Russia.

Irish importers of flax seed are fully alive to the situation, but as the customary credit arrangements are disorganised, it is probable that all transactions must be on a cash basis. Accordingly, if Irish growers are to secure seed, they must not only place their orders immediately, but they may also have to pay cash.

Flax seed must be stored in a dry, airy place, or its germinating power may be impaired.

In some parts of Ireland there is an idea that only Riga seed is suited for the soil and district. The Department's experiments, however, have clearly shown that the main consideration in buying flax seed is not whether it comes from Russia or from Holland, but that it is pure and of good germination. *Farmers, therefore, who have hitherto used exclusively Riga seed need have no hesitation in buying Dutch seed if they can get a good sample.*

The following statement gives the results of the Department's trials of Riga (Russian) and Dutch flax seed. These tests were carried out in several districts and on various kinds of soil from 1901 to 1912 inclusive:—

	Russian Seed Imported by the Department.	Belfast Brand of Riga Seed.	Dutch Seed Imported by the Department.	Belfast Brand of Dutch Seed.
1901				
Yield of Scutched Flax per st. acre	45 st. 6 lb.	43 st. 4 lb.	44 st. 4 lb.	43 st. 5 lb.
Total Returns per st. acre .	£18 4 11	£17 11 3	£17 5 0	£17 1 5
1902				
Yield of Scutched Flax per st. acre	39 st. 10 lb.	38 st. 3 lb.	34 st. 9 lb.	36 st. 1 lb.
Total Returns per st. acre .	£15 16 1	£14 12 11	£13 12 3	£13 16 6
1903				
Yield of Scutched Flax per st. acre	Not tested	9 st. 3 lb.	14 st. 13 lb.	15 st. 8 lb.
Total Returns per st. acre .		£3 17 1	£6 11 4	£6 14 1
1904				
Yield of Scutched Flax per st. acre	21 st. 12 lb.	21 st. 6 lb.	24 st. 6 lb.	23 st. 5 lb.
Total Returns per st. acre .	£9 10 1	£9 8 0	£10 12 2	£10 5 10
1905				
Yield of Scutched Flax per st. acre	32 st. 4 lb.	24 st. 6 lb.	34 st. 4 lb.	34 st. 6 lb.
Total Returns per st. acre .	£14 0 8	£10 1 9	£14 8 0	£14 12 0
1906				
Yield of Scutched Flax per st. acre	33 st. 8 lb.	31 st. 4 lb.	36 st. 7 lb.	37 st. 4 lb.
Total Returns per st. acre .	£12 19 7	£12 4 9	£13 15 1	£14 8 7
1907				
Yield of Scutched Flax per st. acre	37 st. 12 lb.	34 st. 11 lb.	37 st. 12 lb.	33 st. 8 lb.
Total Returns per st. acre .	£12 19 9	£11 18 8	£13 0 4	£11 2 6
1908				
Yield of Scutched Flax per st. acre	41 st. 8 lb.	37 st. 6 lb.	37 st. 6 lb.	35 st. 6 lb.
Total Returns per st. acre .	£14 17 0	£13 9 7	£12 13 10	£12 1 11
1909				
Yield of Scutched Flax per st. acre	34 st. 8 lb.	30 st. 8 lb.	37 st. 12 lb.	32 st. 6 lb.
Total Returns per st. acre .	£14 2 7	£12 12 0	£15 14 8	£13 1 1
1910				
Yield of Scutched Flax per st. acre	37 st. 11 lb.	40 st. 5 lb.	37 st. 12 lb.	33 st. 12 lb.
Total Returns per st. acre .	£18 19 1	£21 3 8	£19 7 7	£17 2 11
1911				
Yield of Scutched Flax per st. acre	39 st. 5 lb.	A 35 st. 0 lb. B 36 st. 5 lb.	36 st. 11 lb.	32 st. 3 lb.
Total Returns per st. acre .	£16 5 10	A £14 6 7 B £15 3 4	£15 5 2	£12 2 5
1912				
Yield of Scutched Flax per st. acre	35 st. 1 lb.	34 st. 0 lb.	38 st. 0 lb.	36 st. 1 lb.
Total Returns per st. acre .	£14 16 9	£14 12 2	£15 9 9	£14 12 8

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
September, 1914.

Copies of this article in leaflet form (No. 29) may be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.

EARLY POTATO GROWING.

The results of this crop this year have been much more varied than in former years. This is entirely accounted for by some extraordinary variations of weather during the early summer, chiefly on account of a severe frosting which many of the crops experienced on the 24th of May. The peculiarity of this frost in Ireland as well as in England and Scotland was that it was most severe in positions which are usually regarded as immune, while other districts recognised as liable to frost, entirely escaped. Following the frost there was a very severe and lengthened drought in June and this still further tended to reduce the yield.

Co. Dublin.

In County Dublin the crops were an outstanding success. The weather throughout seemed to favour them. There was a good planting time, no May frosts, and abundance of rain at end of May and early June just when the crop required it. The result was an abnormally heavy yield at a comparatively early date. One large grower at Skerries reports that this is the most favourable year he has ever had, raising the high average of 10 tons to the Irish acre between 2nd and 25th June. This same grower reports that the late variety of "Up-to-date" was ready to lift on the 1st of July, a truly remarkable illustration of the value of sprouting in boxes. This grower's produce was entirely sent to England and Scotland, and although the price was lower than some former years, the heavy crop more than compensated.

Still more remarkable results were attained at Rush, the crops over the whole district being of uniform excellence. English and North of Ireland buyers appeared in the first week of June with their barrels and other utensils, and the first consignment was sent to Liverpool on 11th of June, where the satisfactory price of 10*s.* 6*d.* per cwt. was realised. The drop in price from that high figure was, of course, rapid, and by the 25th of June the net price on rails at Rush Station was 6*s.* 9*d.* per cwt.

Some of the growers estimated their crop at 12 tons per statute acre, and one of the English buyers, whose third season it was at Rush, declared he had never seen such good crops of potatoes there before. This I can well believe, as when I saw the crop in the first week of June it gave every promise of realising the yield indicated.

Dungarvan District.

At Dungarvan, County Waterford, the crops were far from being of uniform quality. This was not altogether due to the frost, although it was plain that some of the plots had been severely burned. Raising commenced on the 8th of June and continued till the 20th of June and the entire crops of the district were marketed

by Messrs. Warden & Stewart of Belfast, who appeared to have done extremely well for the growers. The results on the whole were extremely satisfactory. One grower realised for his crop at the rate of £64 14*s.* 2*d.* per statute acre, and his estimate of the value of the Broccoli crop succeeding the potatoes is £15 per acre. The results of other growers are as follows:—£49 1*s.* 2*d.*; £50 6*s.* 1*d.*; £45 16*s.*; £48 14*s.* 10*d.*; £43 11*s.* 5*d.*; £43 7*s.* 4*d.*; £36 12*s.* 9*d.*; £35 10*s.* 10*d.*; £31 19*s.* 7*d.*; £25 12*s.*; £24 4*s.* 3*d.*; £29 10*s.* 9*d.*; £24 13*s.* 4*d.*; £28 7*s.* 7*d.*; £23; £19 9s. 1*d.*; £18 14*s.* All the ground was sown with Broccoli cabbage and turnips, the value of which is estimated at from £15 per acre down to £2 10*s.* per acre, the average being about £9. The Reporter from this district remarks that the second crop is not so good as in previous years owing to the extremely dry weather during June and July, and he adds the significant remark: "The plots which got a heavy dressing of artificial manure on the early potato crop are looking splendid and will give a good return for the amount paid for same."

Youghal District.

At Gortroe, near Youghal, in County Cork, there were some magnificent crops and some of mediocre quality. From this district there is no report of individual results, but the average net result of the whole, was £35 16*s.* per acre, and the estimate of the average value of the second crop is £11 per acre.

Co. Sligo.

In County Sligo the experiments initiated by the Department the previous year were continued and there was a large number of growers both in North and South Sligo. This district seems to have suffered most from the May frost, many of the crops making a bad recovery. Wherever there was a plot which escaped the frost it realised a very large sum, the best results on the whole being obtained from North Sligo where there is some very suitable soil and apparently a better climate than in South Sligo. There were 24 growers in this district, the entire produce being sold to Messrs. Warden & Stewart, and the following are the net returns per statute acre after a deduction of 5 per cent. for expenses:—£53 3*s.* 6*d.*; £44 19*s.* 5*d.*; £42 6*s.*; £48 16*s.* 11*d.*; £34 3*s.* 6*d.*; £32 13*s.* 4*d.*; £30 13*s.*; £31 5*s.*; £28 8*s.*; £25 9*s.* 4*d.*; £25 17*s.* 10*d.*; £31 10*s.* 10*d.*; £24 18*s.* 2*d.*; £24 2*s.*; £28 13*s.* 7*d.*; £22 15*s.*; £19 2*s.* 5*d.*; £18 1*s.* 4*d.*; £16 16*s.* 1*d.*; £15 16*s.* 6*d.*; £16 10*s.* 6*d.*; £16 18*s.* 4*d.*; £16 7*s.* 5*d.* The second crop, which consists mostly of turnips, is estimated by the growers to be worth about £11 per acre.

In the districts of Kilmacowen and Knocknarea there were 19 growers and only three of the plots escaped frost and these, as in other cases, realised good figures, the net results being £49, £88, and £80 per statute acre. Only two others exceeded £20 per acre,

several of the plots returning the low price of £12. Digging began in this district on the 2nd of July and finished on the 18th, by which time prices had fallen to 4*s*. per cwt. All the ground is now covered with turnips, vetches and cabbage.

Lissadell District.

The following Report has been sent in by Mr. J. A. Cooper, Agent for Sir Josslyn Gore-Booth, Bart., of Lissadell :—

I have now pleasure in sending you the following report on the Early Potato growing here for the past season.

In all we planted a little over 20 acres—about the same as last season. Of these we got in about 4 acres at the end of February and the balance was not planted until after March 25th—the weather during the most of March being too wet. The outstanding feature of our growing season was the very hard frost on the night of May 24th. May frosts are by no means an exceptional experience of ours, but I think I am right in saying that we have never had such a frost before in May as we had this year. This has made a big difference in the results we have to show. The potatoes planted in February were so far advanced that they suffered far worse than those planted much later, and consequently those planted at the end of March were ready for digging first. About 4 acres were so badly frosted that they were hardly worth digging—I have thought it might be of interest to show these separately in the return underneath. We commenced digging—small patches unfrosted—on June 15th.

"Ninetyfold" continues with us to be the earliest variety. "Epicure" with us comes next. We are not greatly impressed with "Midlothian Early," and we think that we can safely discard this variety. Our experience here year after year has shown, that for us at any rate, there is nothing to beat "Ninetyfold" followed by "Epicure."

The following gives the details of this year's crop :—

Variety.	Area Statute.			Date Planted.	Date Lifted.	Yield			Average Yield per Statute acre.		
	A.	R.	P.			T.	C.	Q.	T.	C.	Q.
Ninetyfold .	4	3	20	25th to 28th March	15th to 27th June	21	10	0	4	8	0
Ninetyfold .	1	2	8	25th to 28th March	25th to 28th July	7	8	2	4	15	3
Midlothian Early .	1	2	10	4th April	23rd to 25th July	6	17	2	4	8	0
Epicures .	1	3	5	28th February	25th to 28th July	7	12	3	4	5	3
Epicures .	6	3	25	1st to 8th Apl.	29th June to 21st July	49	11	1	7	3	2
Epicures .	2	0	0	28th Feb.	July–August	2	5	0	1	2	2
Epicures .	2	0	0	1st April	July–August	2	15	0	1	7	2
	20	2	28			98	0	0	4	14	3

The average yield per acre is thus a little better than our average last year, even with the handicap of the 4 acres mentioned above, but the average price received per acre was one of the worst that we have yet obtained.

In the above return is included 26 tons 5 cwts. of seed potatoes which we have retained for next season. We have taken these in at £4 per ton, and it is obvious that this tends to bring down the average received per acre and per ton.

We were only able to dispose of 2,828 chip baskets this season as against 6,280 in 1913, and 9,768 in 1912. This we think is not the fault of the basket, but in any case it hardly pays to sell in the chip baskets unless when the crop is early and good prices are being realised. Our men are now well used to packing these baskets and they certainly travel very well, whilst it is a great advantage that they are a non-returnable packet. If the crop is ready early, I believe that it will pay to market some at any rate in these packages.

Principally owing to the small number of chips used, our marketing expenses were much less this season than during the past 4 years—the figures being, this season, £92 1*s.* 7*d.*; 1913, £133 2*s.* 1*d.*; 1912, £176 1*s.* 3*d.*; 1911, £131 9*s.* 4*d.* In 1910 our marketing expenses were only £40 10*s.* 6*d.*, which was before we started selling any potatoes in chip baskets. These expenses include the cost of chips, twine, freight, commission, etc., and where barrels are used the freight on empties and wear and tear of barrels is also included.

Each year since we started growing here in 1903 under your guidance we have shown the years' results as compared with any preceding and the following comparative table may be of some interest:—

Year.	Commenced digging on.	Total area for sale, statute.	Yield.	Gross receipts.	Average received per ton (gross).	Average return per statute acre (gross).	Average yield per statute acre.
		A. R. P.	T. C. Q.	£ s. d.	£ s. d.	£ s. d.	T. C. Q.
1903	June 9	2 3 39	15 12 1	159 14 4	10 0 0	53 0 0	5 4 0
1904	„ 7	4 3 5	22 3 1	181 15 1	8 4 0	38 0 0	4 12 0
1905	„ 13	5 2 20	34 18 2	230 11 5	6 12 0	41 0 0	6 4 0
1906	„ 23	4 2 21	21 17 3	148 10 4	6 15 0	30 0 0	4 14 0
1907	„ 11	15 0 12	64 4 1	399 4 10	6 11 3	26 0 0	4 5 0
1908	„ 22	10 3 0	62 2 2	264 1 5	4 5 0	24 11 3	5 15 2
1909	„ 7	11 0 36	49 5 2	309 12 4	6 5 8	27 11 7	4 7 3
1910	„ 15	11 2 36	71 15 3	326 8 0	4 11 0	27 13 4	6 2 1
1911	„ 5	14 1 13	79 7 0	585 5 10	7 7 6	40 16 10	5 10 2
1912	May 30	18 3 28	117 17 2	781 10 1	6 12 7	41 5 11	6 4 2
1913	June 19	20 0 0	92 12 1	618 16 4	6 13 4	30 18 10	4 12 2
1914	„ 15	20 2 28	98 0 0	544 9 4	5 11 1	25 2 6	4 14 3

We thought that last year was disappointing—this year's gross receipts it will be seen are poorer. This we think was entirely caused by the one night's frost—an expensive frost for us as it probably caused a drop of perhaps £200 in the above return. We have considered the possibility of keeping these May frosts off our early potatoes by means (say) of "smudging" fires. On a small area it might be feasible to stop the effect of frost but possibly it would hardly be practicable over large areas. It should be quite easy to get timely warning of frost, but although I understand that "smudging" fires are largely used in Canada in the case of wheat, I don't know if these have been tried in Scotland or Ireland on early potatoes. It would be of great service generally if something could be done, and we here would be quite willing to try it if desired.

Each year in the past we have had a second crop—such as Yellow Turnips, Italian Rye Grass, Barley, Cabbage, etc., after the early potatoes were dug. The advantage of having two crops is obvious any year. This year it is more than ever advisable and in addition to planting Italian Rye Grass, Yellow Turnips, Tares, Rape, and Rye, we have planted Broccoli, Early York, and Kale.

Perhaps I may mention also that we are trying this year to run in another crop of Rye and Tares after some of our Oats.—Yours faithfully,

J. A. Cooper,

Agent for Sir Josslyn Gore-Booth, Bart.

The results of this exceedingly well managed farm indicate the severity of the weather.

The variety which seems to have done best this year is "Epicure," and that is easily understood as it is a much stronger and more vigorous plant than "Ninetyfold" and though slightly later is likely to give better results in an adverse season. Growers however would do well to plant a portion of each as many markets demand the kidney shape and reject the deep-eyed round. On many of the plots in the Sligo district especially, the tillage operations might have been better done. Early potatoes demand as few obstacles as possible and they will not flourish alongside weeds. On the whole I regard the results as extremely satisfactory considering the weather drawbacks of the season.

M. G. Wallace.

OFFICIAL DOCUMENTS.

I.—AGRICULTURE.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

THE WAR AND FARMING INDUSTRY.

Warning to Farmers.

In view of the present situation, it is most desirable that farmers should at once take into consideration the question of how the War as it develops will affect their industry. There is great danger that, should prices increase, farmers might be tempted to sell, not merely their surplus stock, but even breeding animals. This, in the long run, would be fatal to their own interests as well as to the maintenance of the food supply of the country. There is also a danger that increased prices will tempt farmers hurriedly to thresh and sell all their grain crops. Food may be scarce next season, and it is not inconceivable that a much bigger sowing may be both necessary and profitable in the coming year. Moreover, feeding stuffs for stock may be scarce and dear, and if all grain crops are now sold it may not be possible to feed breeding and young stock properly in the spring.

The system of catch-cropping which has been extensively advocated and demonstrated for a number of years by Agricultural Instructors is one to which the attention of farmers is now very specially directed. There can be few who have not had the opportunity of seeing such crops grown and of recognising their advantages. The early harvest is specially favourable for preparing stubble as well as land which has been occupied by flax or early potatoes for catch crops, and there should be no difficulty in growing them on a part of the land intended for next year's root crop. The chances of success with catch crops in the South are good. A leaflet dealing with the cultivation of such crops has been published by the Department and can be had on application.

Spring vegetables should not be overlooked. Farmers, labourers, and others having spare ground should plant cabbages and other vegetables for home use. See leaflet issued by the Department.

The circumstances demand serious and careful consideration of all these points in order to insure the maintenance of our stock and to make the most of the food supplies available.

August, 1914.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

CULTIVATION OF SPRING VEGETABLES.

The present high price of some vegetables, the possibility of a scarcity in spring, and the evident desire of everyone to do something to meet the effect of the War, have created a general desire for information as to the cultivation of vegetables for early spring use. A great deal can be done at this season, but the drought, if continued, may render many efforts ineffective.

Cabbage.—The most common and useful vegetable is the cabbage. If plants of any of the early York varieties can be obtained during August or September and put into well-manured land, good heads may be got, if the winter is favourable, from January onwards. If plants cannot be procured, seed if sown immediately may be expected to yield plants that can be transplanted from the end of September onwards, yielding heads fit for use from the end of March; or they may be used as food before they are "hearted." Any plants of the cabbage tribe such as late Broccoli, Brussels Sprouts, Kale or Savoy may be transplanted this month, and those who have more plants than they require should give their surplus stocks to others.

For sowing now and transplanting in September onwards among the best varieties of cabbage are Ellam's Early, Early Offenham, Improved Nonpareil and Harbinger.

Cauliflower.—Cauliflower seed may be sown now, but the plants require special attention and shelter. Early Erfurt, Early London, and Veitch's Autumn Giant are among the best varieties.

Seakale or Silver Beet.—This is not so well known, but makes a very good vegetable in spring. If seed is sown now and transplanted about the end of September good leaf stalks may be got early in May which can be used like ordinary seakale. The green leaves may also be used in the same manner as spinach.

Turnips.—These may be sown now after potatoes broadcast or in drills. They should be ready in March. The best variety is Orange Jelly or Golden Ball.

Onions.—Sow now broadcast or in drills. These should be ready to transplant from January onwards. The scallions may be used as soon as they are large enough. In June the bulbs should be ready for use. Any of the Tripoli varieties may be sown; for choice, Giant Rocca and Red Italian.

Perpetual Spinach Beet.—This may be sown in drills at this season. The green leaves are as good in spring as ordinary spinach.

All those who have gardens, and especially labourers who have plots, should try some of these vegetables. The chance of a good crop will be greatly increased if in February a small quantity of nitrate of soda is applied to the plants.

Attention is directed to the Department's pamphlet on "The Management of a Cottage Garden," which can be obtained through any bookseller or direct from Messrs. E. Ponsonby, Ltd., Grafton Street, Dublin, price 1*d*., by post 1½*d*.

August, 1914.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

THE WAR AND THE FARMING INDUSTRY.

AUTUMN SOWN CEREALS.

NOTICE TO FARMERS.

In a previous notice to farmers, the Department called attention to the importance of keeping sufficient seed of oats and wheat to sow a largely extended area next season. Threshing is now in progress in many districts and the moment is, therefore, opportune for issuing a fresh notice on the subject.

Apart from the fact that it is the duty of farmers to make provision for bread and feeding stuffs, and accordingly to prepare to have a greatly extended area under wheat and oats next year, the prospects of increased prices, having regard to the present European situation, are extremely good.

Brief notes on the cultivation of wheat and winter oats are appended, but as it is impossible in a leaflet to give directions which would be suitable in every case, the help of the Agricultural Instructor should be sought when that is deemed necessary.

WHEAT.

Wheat may be sown either in the autumn or spring, but as winter wheats are, as a rule, more prolific than those suitable for spring sowing they are to be preferred where yield alone is the determining factor.

The varieties recommended are, for autumn sowing :—

Queen Wilhelmina,
Squarehead Master,
White Stand-up ;

and for spring sowing ;—

Red Fife.

Red Fife is essentially a spring wheat and especially suitable to light soils. Although a less productive variety than the three winter wheats mentioned above its early ripening properties render it a valuable variety, when weather or other conditions make autumn sowing impossible and spring sowing necessary.

Winter wheat may be sown on most land now under potatoes and mangels ; it may also be sown after first or second year's grass which has been cut for hay or grazed. After grass the land is prepared much the same as for oats, but for wheat a deep firm seed bed is absolutely essential.

To obtain the best results both winter and spring wheat should be sown as early as possible. October and up to the middle of November is a good time to sow winter varieties, whilst any time after the middle of February is suitable for spring wheats.

From 11 to 14 stones of seed per statute acre are sufficient when drilled in, and if broad-casted a slightly larger quantity should be used. *Red Fife* should be sown at the rate of 16 to 18 stones per statute acre. When wheat is sown after potatoes and mangels it is not as a rule necessary to apply any artificial manures, but in the event of the plants tillering badly, or of a severe wireworm or leather-jacket attack, 1 cwt. of nitrate of soda per statute care may be applied in the spring. If sown after grass a dressing of 3 to 4 cwt. of Superphosphate per statute acre may be applied at the time of sowing.

In normal circumstances the addition of Kainit would be profitable, but if this manure is not available at the usual prices it may be dispensed with.

In view of a probable increased demand for wheat seed this autumn farmers are recommended to make immediate arrangements to secure whatever quantities they require. They should also take the precaution of having their seed tested at the Department's Seed Testing Station, for which there is a nominal charge of 3*d*. per sample. Seed testing takes at least 14 days; there is therefore no time to be lost by those who intend sowing this autumn and wish their seed to be tested before they begin.

Winter Oats.

The attention of farmers is particularly directed to winter sown oats. These may be sown after root crops or grass of all descriptions. The Tawny oat and the black winter oat are recommended and should be sown in October if possible. The Tawny oat is grown extensively in the south-east of Ireland, particularly in County Wexford. It should not be difficult to get seed through the usual trade channels.

Grass lands too light for wheat may be ploughed and sown with this crop. Winter oats have the advantage of being ready for food much earlier than spring-sown oats, and moreover they permit of catch-cropping being successfully practised.

The ground is prepared in the usual manner and from 3 to 4 cwt. Superphosphate should be applied per statute acre immediately before sowing if the land is poor. Thirteen to sixteen stones of seed per statute acre may be drilled or sown.

September, 1914.

Department of Agriculture and Technical Instruction for Ireland.

SPRING FEEDING FOR STOCK.

EFFECT OF THE WAR.

The attention of farmers is directed to the possibility of feeding stuffs being scarce and dear next spring. It is to be borne in mind that, apart from the present situation, the hay crop is light and the turnip crop doubtful. Moreover, much of the

grain which in ordinary circumstances would be fed to stock may be better utilised as food for human consumption, and particularly for seed, of which more than the usual quantity may be required.

A great deal can be done to provide food for stock next spring by sowing now the following winter crops:—

(1) Giant rape;
(2) Hybrid Turnips—also known as Hardy Greens or Starters.
(3) Giant Essex rye;
(4) Winter vetches, with either rye, winter oats, or winter wheat;
(5) Italian rye grass.

These may be sown during this month after the following crops:—

(1) Early or mid-season potatoes;
(2) Oats or barley;
(3) Flax; or
(4) Grass.

Giant Rape may be sown after all the crops mentioned; after potatoes all that is required is to sow the seed and harrow the land; after other crops the land will require to be ploughed and harrowed before the seed is sown, and then the seed covered by harrowing again. The seed should be sown broadcast at the rate of 7 or 8 lbs. per statute acre.

Hybrid Turnips may be sown as described above for rape, and at the same rate per acre.

Giant Essex Rye may be sown after all the crops mentioned. The land will require to be ploughed; the seed may then be sown and harrowed in the same way as for oats. Seeding should be at the rate of 16 stones per statute acre.

Winter Vetches may follow all the crops mentioned. The land should be ploughed and the vetches sown broadcast as in the case of an ordinary grain crop. Along with the vetches should be sown either rye, winter oats or winter wheat; the rate of seeding should be about 8 stones of vetches and 4 stones of grain per statute acre.

Italian Ryegrass will give the best results when sown after potatoes. The seed may be sown broadcast at the rate of at least 3 bushels per statute acre, and covered by harrowing lightly.

Autumn Manuring—After potatoes no manure need be applied. After oats, barley, flax or grass, if possible a dressing of dung should be ploughed under. If dung is not available, artificial manure should be applied after the land has been ploughed and cleaned, and before sowing the seed. A suitable manuring for all these crops is 3 or 4 cwt. superphosphate and 2 cwt. kainit; or 5 cwt. potassic superphosphate per statute acre.

SPRING MANURING—To ensure a successful and early crop it is essential that a dressing of 1 cwt. of nitrate of soda per statute acre should be applied in February in every case.

To sum up:—(1) Sow during August, or at the very latest early in September. (2) If possible, apply farmyard manure in all cases except after potatoes. (3) Apply nitrate of soda in February. (4) Secure from the Department of Agriculture a copy of leaflet No. 80 which gives fuller particulars regarding catch crops.

August, 1914.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET,
DUBLIN, 10*th August*, 1914.

No. A. 11740/14.

SIR,

I have to transmit herewith, for the information of the County Council of ...., a copy of an Order* made by the Department under the Destructive Insects and Pests Acts, 1877 and 1907, for the purpose of preventing the spreading in Ireland of American Gooseberry Mildew and Black Currant Mite. The injurious results of these diseases and their highly infectious nature are explained in the Department's leaflets Nos. 47 and 76, copies of which are enclosed.

It will be observed that, under the Order, fruit growers may be required to destroy gooseberry bushes affected with American Gooseberry Mildew, as well as black currant bushes affected with Black Currant Mite. When the disease known as American Gooseberry Mildew was first dealt with by the Department, the spraying and pruning of diseased bushes was in some instances permitted as an experiment to ascertain whether such treatment would succeed in controlling the disease. Having regard to the results of the experiments so far carried out, and to the information at the disposal of their Plant Disease Division, the Department are of opinion that the only effective method of preventing the spread of the disease in Ireland is to have the bushes destroyed. Similarly, the destruction of infected bushes has also been found to be the only satisfactory means of dealing with Black Currant Mite.

Consequently the usual procedure is to serve a notice on the occupier of the premises on which diseased bushes are found, requiring him to have the bushes uprooted and burned. As the spores of American Gooseberry Mildew are borne not only on the leaves and stems of gooseberry bushes, but also on the fruit, it is necessary to prohibit the marketing of any berries from diseased bushes.

Applications for compensation have recently been received from fruit growers whose bushes or fruit have had to be destroyed in pursuance of Notices under the Order. A memorandum re-

* See the issue of the JOURNAL for January, 1913, Vol. XIII., No. 2.

ferring to the Sections in the Act dealing with payment of compensation is enclosed, from which it will be observed that the Acts provide for the payment of compensation out of the local rate. The Department are advised that these payments are to be borne on the general county rates and not on the special rate struck for the purposes of the Agriculture and Technical Instruction Act of 1899. It will be noted that while the Order directing payment of compensation is to be made by the Department, Section 1 (1) of the Destructive Insects and Pests Act of 1907 declares in effect that such an Order shall not be made without the consent of the County Council, who are now the local authority for the purposes of the Act. Should the County Council be willing that an Order of the nature referred to should be made by the Department it is suggested that a resolution to that effect should be adopted by the County Council, and that a sealed copy should be forwarded to the Department.

Should there be any additional information which the Department may be able to afford, and which would assist the Council in coming to a decision on the matter, the Department will be glad to furnish it if so requested.

I am,
Sir,
Your obedient Servant,

T. P. GILL,
Secretary.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

MEMORANDUM WITH REFERENCE TO SECTIONS 3, 4 AND 7 OF THE DESTRUCTIVE INSECTS ACT, 1877, AND TO SECTION 1, SUB-SECTION 1 OF THE DESTRUCTIVE INSECTS AND PESTS ACT, 1907.

It will be observed that Section 3 of the Destructive Insects Act of 1877 empowered the Lord Lieutenant in Council to direct the payment by a local authority of compensation for crops removed or destroyed in compliance with any order made under that Act. Under the provisions of Section 2, Sub-Section 1 (*b*) of the Agriculture and Technical Instruction Act, 1899, the powers of the Lord Lieutenant in Council under the Destructive Insects Act, 1877, have been transferred to the Department. Section 7, Sub-Section 2 of the Destructive Insects Act, 1877, provided that the local authorities "shall be the Boards of Guardians of the several Poor Law Unions." Section 6 (*b*) of the Local Government (Ireland) Act, 1898, however, transferred to the Council of each County "the business of the Guardians as Local Authorities under the Destructive Insects Act, 1877." Section 4 of the 1877 Act

provided that "the expenses incurred and compensation paid by a local authority (i.e., a County Council) in pursuance of any Order under this Act shall be paid by them out of the local rate." Section 1 (1) of the Destructive Insects and Pests Act, 1907, provided that Orders may be made for preventing the spreading of any insect, fungus or other pest destructive to agricultural or horticultural crops or to trees or bushes. This Act did not make any alteration as regards the authority by whom compensation should be paid, but provided that the Department should not make an Order directing the payment of compensation except with the consent of the local authority (i.e., of the County Council).

As regards the basis on which the amount payable in compensation is to be calculated, attention is directed in particular to Section 3 of the Act of 1877. The Department are advised that for the purposes of calculating compensation payable for gooseberry and black currant bushes destroyed in compliance with an Order made under the Act, the "value of the crop" may be interpreted as meaning the value which the bushes, if unaffected with the disease, would have had at the time of their removal or destruction.

The Secretary,
County Council.

SCHEME NO. 20A.
Under Revision.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

REGISTRATION OF PURE-BRED DAIRY SHORTHORN CATTLE.

The Department will keep a Register of dairy cattle (hereinafter referred to as the Register) in which cows and their progeny may be entered, subject to the provisions of this Scheme. The Inspection of cows, with a view to entry on the Register, will be carried out by the Department.

1. *Type of cows eligible for registration.*—Owners of Pure-Bred dairy Shorthorn cows may apply on the prescribed form for the inspection of their stock by the Department as regards :—

(*a*) General appearance;
(*b*) Milk yield.

Only good cows are eligible.

2. *Application and entry fee.*—Inspections of cows for provisional selection will be carried out twice each year. Applications for the first inspection should be lodged with the Department on Form A. 63 not later than the 31st August, and for the second inspection not later than the 12th December. Applications must be accompanied by a fee of 2*s*. 6*d*. in respect of each cow entered for inspection.

Cow owners presenting animals for inspection will be refunded all fees paid by them, except in respect of cows which are provisionally selected for registration under Clause 3.

3. *Places of inspection.*—Provisional selection will be made at local exhibitions, or at such other convenient centres as may be determined by the Department as soon as practicable after 31st August and 12th December. The Department will give due notice to each cow owner of the centre fixed for the inspection of his animals.

All animals provisionally selected for general appearance under this scheme will be suitably marked by the Department for future identification.

PROVISIONALLY SELECTED COWS.

4. *Conditions to be observed.*—Owners of cows provisionally selected under Clause 3 are required to observe the following conditions :—

(*a*) To provide themselves with an approved type of machine for weighing milk ;

(*b*) To weigh the milk yielded by each cow on every seventh day during the milking period (the exact day of the week for each herd will be fixed by the Department), and to record the same on Form A. 64, which will be provided by the Department for the purpose ;

(*c*) To permit their herds to be inspected by the Department at any time ; and

(*d*) To afford the Department every facility for examining the milk records and the weighing of the milk, and for taking samples of the milk of each selected animal.

5. *Forwarding of milk records.*—Form A. 64 containing the records kept under Clause 4 (*b*) shall be forwarded by the owner of the cow to the Department as soon as the milk yield for a milking period has been recorded, or at such other time or times as the Department may require.

The term " milking period " shall mean the period during which a cow continues to yield milk after calving. Provided that if such period exceeds 45 weeks, the first 45 weeks after calving shall be regarded as the cow's milking period.

Owners should forward the milk record forms at the proper time without waiting for an application for them from the Department. Postage need not be prepaid.

6. *Registration of cows.*—As soon as possible after the receipt of Form A. 64 the Department will notify to the owner their decision as to the registration or rejection of the animal whose milk yield is recorded on the Form.

REGISTERED COWS.

7. *Conditions to be observed.*—The owner of each registered cow shall comply with the following conditions :—

(*a*) To have the animal served by a Pure-Bred Shorthorn bull. The bull must be passed by the Department as up to premium standard.

(*b*) To furnish to the Department on the prescribed form (A. 66) within seven days from the date of birth, particulars regarding sex, colour, markings, etc., of each calf produced by a registered cow, and such particulars of the sire and dam as the Department may require; and

(*c*) To keep on the prescribed form (A. 79) a record of the breeding, date of birth, etc., of progeny, for the purposes of future registration. This record shall be open to inspection at any time by the Department.

8. *Inspection of progeny.*—The female progeny of registered cows served by bulls approved under Clause 7 (*a*) will be eligible for provisional selection when about two years old, at a fee of 2*s.* 6*d.* each.

Applications for the inspection of female progeny should be made at the times set forth in Clause 2.

Registered Dairy Bulls.

9. Male progeny in respect of which the conditions of Clause 7 have been complied with, will be eligible for inspection with a view to provisional selection for premiums under the Department's Cattle Breeding Scheme, within the limits of age specified therein. Any bull so selected will be entered in the Register as a "Registered Pure-Bred Dairy Bull."

Applications for the inspection of male progeny should be made in December on the prescribed form.

10. *Disposal of cow or calf to be notified.*—When a registered cow or calf has been disposed of the Department should be notified of the fact within fourteen days of the disposal of the animal, and at the same time advised of the name and address of the new owner.

The death of a registered cow or her calf should also be notified to the Department within fourteen days of the death of the animal.

Failure to observe this regulation may entail the removal from the Register of the animals entered in the name of the person in default.

11. The Department reserve the right, without assigning any reason for their action, (*a*) to remove the name of any animal from their Register, and (*b*) to refuse to inspect or register any cow or the progeny of any registered cow.

12. *Modification of Scheme.*—This Scheme is subject to modification or withdrawal at the discretion of the Department.

13. *Department's decision final.*—In all cases of dispute in matters connected with this Scheme the decision of the Department shall be final.

April, 1914.

No. A. 7774.-13.

Department of Agriculture and Technical Instruction for Ireland.

EGG-LAYING COMPETITION, 1914-15.

1. The laying competition inaugurated by the Department in 1912 will be continued at the Munster Institute, Cork, during the year 1914-15, with pullets bred in Ireland.

2. The competition will be in the charge of the Instructor in Poultry Keeping at the Munster Institute, who will have no knowledge of the ownership of the birds, each pen being known by a number only.

CONDITIONS.

3. Competitors will not be permitted to visit the competition or to communicate with the Instructor in charge. Any breach of this condition will entail the disqualification of the competitor's pen or pens.

4. The following records will be kept :—

(*a*) The number of eggs laid by each bird ;
(*b*) The average weight of eggs of the different breeds ;
(*c*) The market value of eggs laid *per pen per month.*

5. Only pullets of the undermentioned breeds, which are recognised under the Department's Poultry Scheme for 1913-14, will be accepted :—

Black Minorcas, White Leghorns, Brown Leghorns, Barred Plymouth Rocks, White Orpingtons, Buff Orpingtons, White Wyandottes, Salmon Faverolles, Sussex, Rhode Island Reds.

6. The number of pens will be limited to fifty ; each pen consisting of six pullets *of one breed* hatched subsequently to 1st January, 1914. *No male birds will be allowed.*

7. A separate house and run will be provided for each pen, and one trap nest for every two birds.

8. All birds will be fed on similar food. Patent foods or spices will not be used in the competition.

9. All eggs laid will be sold and the amount thereby realised applied towards defraying the cost of the competition.

10. Any bird showing symptoms of disease will be removed at once and the owner given the opportunity of replacing it. A like option will be granted in the case of the death of a bird.

11. The laying competition will begin on Thursday, 1st October, 1914, and end on Tuesday, 31st August, 1915.

12. Entries should be submitted on Form A. 413, copies of which can be obtained free on application to the Department.

13. An intending competitor may enter more than one pen for the competition, but in the event of entries being received from more than fifty persons, one pen only will be allotted to an individual competitor.

14. If entries are received from more than fifty persons the Department will make a selection so as to have each county represented as far as possible.

15. Entry forms accompanied by a fee of 10*s*. in respect of each pen offered should be forwarded to the Department not later than 18th August, 1914.

16. Fees will be returned to those persons whose entries are not accepted. In the case of pens accepted for the competition, the entry fee will be returned to each competitor whose birds lay an average of not less than 140 eggs each.

17. As soon as practicable after 18th August, 1914, the Department will notify intending competitors whether their entries have been accepted or not, and will send to each selected competitor an addressed label, with the pen number thereon, to be attached securely to the hamper, etc., in which the birds are forwarded. Special rings for the birds entered will also be supplied to each selected competitor, and *no other ring will be accepted.* Birds with rings other than these special rings will be rejected.

18. Selected competitors should forward birds so as to reach Cork on Wednesday, the 23rd September, 1914.

Birds should be consigned *carriage paid* to Cork, otherwise the Department will refuse to accept delivery.

19. The Department reserve the right to reject birds which they consider in any way unsuitable.

20. While every care will be taken, the Department will not be responsible for loss or injury to birds in any way in connection with this competition.

21. Those birds which have been rejected by the Department, and, on the termination of the competition, all other birds will be returned *carriage forward* to the respective owners.

Prizes and Certificates.

22. Eight prizes will be awarded for the pens laying eggs of the highest market value, as follows:—1st prize, £5; 2nd prize, £4; 3rd prize, £3; 4th prize, £2; 5th prize, £1 10*s.*; 6th prize, £1 5*s.*; 7th prize, 15*s.*; 8th prize, 10*s.*

23. A special prize of £1 will be awarded to the pen laying eggs of greatest value from 1st October, 1914, to 31st January, 1915.

24. A special prize of £1 will also be awarded in each of the following cases: (1) for the pullet (non-sitting breed) laying eggs of greatest value during the competition; (2) for the pullet (sitting breed) laying eggs of greatest value during the competition.

25. Certificates will be awarded as follows:—

(1) A First Class Certificate for each pen laying an average of 200 eggs or over per bird;

(2) A Second Class Certificate for each pen laying an average of 160 eggs per bird.

26. In the event of the eggs from any pen during the first three months of the competition weighing on an average less than $1\frac{3}{4}$ oz. each, the birds will not be eligible for the award of prizes or certificates, but they will be allowed to complete the test.

27. In all matters relating to this competition the decision of the Department will be final.

The Department further propose to carry out tests with birds of different ages in order to determine the relative profit to be made by keeping birds for one, two, or three years respectively. In addition, experiments will be conducted in various methods of feeding poultry, and with different rations.

Upper Merrion Street,
Dublin,

June, 1914.

II.—TECHNICAL INSTRUCTION.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

SPECIAL REGULATIONS FOR THE CONDUCT OF CLASSES IN FIRST AID TO THE INJURED, HYGIENE AND EMERGENCY NURSING, AND AMBULANCE WORK, 1st OCTOBER, 1914.

(*These Regulations remain in force until the* 31*st December*, 1914, *only. Classes to be opened after that date will be required to conform to such other Regulations as may be subsequently issued.*)

I. Conduct of Classes.

1. A Committee must be formed who will undertake responsibility for the expenses of the classes, including the provision of suitable accommodation and equipment, payment of Instructors' fees, etc.

The Committee may be the Local (Urban or County) Technical Instruction Committee, or a Committee formed under the auspices of any of the existing First Aid Associations, such as the British Red Cross Society, the St. Patrick's Ambulance Association, the St. John's Ambulance Association, the Women's National Health Association, the Irish Volunteer Aid Association, Cumann na mBan, etc., or a Committee, not connected with any such Association, comprising a few responsible persons in the district.

The Committee must appoint a Secretary, through whom all communications, to and from the Department, are to be made.

2. Application must be made to the Department for the following Forms:—

(*a*) Form S. 45.—Upon which to notify the proposal to form classes. (This form must be sent in as long as possible before the proposed date of the first meeting of the class.)

(*b*) Flyleaf to Form S. 45.—Upon which to show the days and hours of meeting of the class and the number of students enrolled. (*This form must not be sent in until after the first Meeting of the class, but as soon as possible thereafter.*)

(*c*) Form S. 40.—Upon which to return the signatures of the Members of the Committee.

These forms, duly completed, must be returned to—

The Secretary,
Department of Agriculture and
Technical Instruction for Ireland,
Upper Merrion Street, Dublin,

and the envelope marked "First Aid."

3. After the Time Table (Flyleaf to Form S. 45) has been submitted to the Department, no change in the teaching staff, or in the days or hours of meeting of the classes, may be made until the Department have been notified, *and their approval of the proposed changes notified to the Committee in writing.*

4. Official registers in which to record the attendances of the students will be issued immediately upon receipt of Form S. 45 in the Department's Offices. Classes should not be begun before these Registers have been received. Attendances made at instruction given before the receipt of the Registers cannot be recognised by the Department.

Care must be taken that not more than 30 names are entered in any Register, nor may the name of a student be erased and another substituted. A second Register, if required, in which to enter the names of students admitted to the class in lieu of others who have left, can be obtained on application.

The Registers must be kept strictly in accordance with the instructions printed thereon. Within the first 10 minutes of the lesson the attendance of the students must be recorded and the total number of students present entered in the space provided at the foot of the Register. Students not present at the time of the marking of the Register must be returned as absent, and cannot obtain credit for an attendance if they arrive after the closing of the Register.

5. Each student must fill up an Entrance Form. Supplies of these forms can be obtained from the Department on application stating the number required. The Entrance Forms completed by the students must be forwarded to the Department at the close of the course together with the Attendance Registers and the Form of Claim for Grants (see Regulation 14).

6. The syllabus of instruction is divided into three parts, viz., Part I., First Aid to the Injured ; Part II., Hygiene and Emergency Nursing ; and Part III., Ambulance Work. Instruction in each part of the syllabus must be given separately, and the course in one part should, as a rule, be completed before the course in a succeeding part is entered upon.

7. At least 20 hours' instruction must be given in each part of the syllabus, and the lessons must be each of not less than 1½ hour's duration.

8. Mixed classes in Parts I. and II. may, if necessary, be arranged, but it is desirable that separate classes for men and women should be held whenever this is possible. The attendance of women students at instruction in Part III. (Ambulance Work) will *not* be recognised.

9. Not more than 20 students may be taken at one time for instruction in any part of the syllabus unless the services of an assistant, recognised by the Department, are provided, in which case the number may be increased to 30.

10. The services of a duly qualified medical practitioner with a trained nurse (with suitable experience) as assistant, should, where possible, be obtained to conduct courses of instruction in Parts I. and II., but the Department will be prepared to extend recognition to persons who have already secured their recognition as teachers of Hygiene and Sick Nursing, and to consider the question of recognition of any person who can produce evidence that he, or she, possesses special qualifications.

In all cases in which persons not qualified as below are recognised by the Department to conduct courses of instruction in Part I. or in Part II., it will be necessary, in order to comply with the regulations of the War Office governing the constitution of Voluntary Aid Detachments, to arrange for at least five special lectures, covering the Syllabus, to be given by persons so qualified.

In Part I. (First Aid to the Injured) the special lectures must be given by a duly qualified medical practitioner.

In Part II. (Hygiene and Emergency Nursing) the special lectures must be given either by a duly qualified medical practitioner, or by a trained nurse* holding a letter of recognition by the Department as a teacher of Hygiene and Sick Nursing.

Classes in Part III. (Ambulance Work) can, as a rule, be efficiently taught only by officers or non-commissioned officers (effective or retired) of the Royal Army Medical Corps. When, however, it is not possible to secure the services of such instructors, early application should be made by letter to the Department for approval of alternative arrangements suggested by the Committee.

11. Trained nurses* and Domestic Economy Instructresses who have successfully attended one of the Department's special courses of instruction in Hygiene and Sick Nursing will be accepted as assistants for Parts I. and II.

Persons holding an advanced certificate of the British Red Cross Society will be accepted as assistants for the subjects named in the certificate.

Persons holding the Medallion of the St. John Ambulance Association will be accepted as assistants for Part I. (First Aid to the Injured).

12. Classes shall be open to inspection, with or without notice, by officers of the Department, who shall be entitled to visit the class at any time during which instruction is returned as being given, and who may test the efficiency of the instruction and the progress of the students in such manner as they may consider necessary.

13. Classes complying with the foregoing Regulations will be eligible for grants under Section II. (*b*) of the Department's Programme for Technical Schools and Classes. Payment will be made at the rate applicable for Pure and Applied Science subjects, viz., 4*d*. per hour for each student. These grants are the only payments that will be made by the Department in aid of these classes.

14. After the close of all the classes the Secretary to the Committee must apply to the Department for Form S. 63 upon which to make a claim for the grant. This claim form when completed must be returned to the Offices of the Department, together with the Attendance Registers and the Students' Entrance Forms.

II. Examinations.

15. Upon application the Department will arrange for the examination of classes in Part I. (First Aid to the Injured), and in Part II. (Hygiene and Emergency Nursing), conducted under the foregoing Regulations. The examination will be held as soon as

* Note—By the term "trained nurse," is meant a nurse who has completed a 3 years' course of training in the service of a general hospital having a nurses' training school attached, and who, having qualified in the examinations of the institution, has received a certificate to this effect.

possible after the close of the course and will be both *viva voce* and practical. Certificates of proficiency will be awarded to students passing these examinations. Attendance at these examinations is *not* compulsory. Examinations will *not* be held in Part III. (Ambulance Work).

The War Office have approved of the Department for the purposes of granting Certificates, and holders of the Department's Certificate of Proficiency in First Aid to the Injured will consequently be eligible for enrolment in Men's Detachments under the War Office Scheme for the Organisation of Voluntary Aid, and holders of the Certificates of Proficiency in First Aid to the Injured and Hygiene and Emergency Nursing, for enrolment in Women's Detachments. The certificates are also recognised by the British Red Cross Society.

16. Candidates for examination in Part II. (Hygiene and Emergency Nursing) must either have passed the Department's examination in Part I. (First Aid to the Injured) or be able to satisfy the Examiner that they possess a sufficient knowledge of the course of work covered by the syllabus of Part I.

17. In order to be eligible for examination in either Part I. or Part II. of the Syllabus, a candidate must have attended at least 20 hours' instruction in a recognised class, including at least four of the Special lectures referred to in Regulation (10).

18. As soon as possible after the opening of a class, the Secretary to the Managers must acquaint the Department whether an examination is required, and at least 14 days before the close furnish information as to the number of students who propose to present themselves for examination.

19. The examiners will be appointed and their expenses paid by the Department, but the Managers will be required to defray any other expenses incurred in connection with the examination.

20. The Secretary to the Managers must arrange for the following :—

For examinations in Part I.—A good supply of bandages (triangular and roller), stretcher, splints, etc. Suitable diagrams must also be available.

For examinations in Part II.—A good supply of roller and other bandages, and of materials for making poultices and hot fermentations, a clinical, ordinary and bath thermometer, temperature charts, and a bedstead with bedding, blankets and sheets.

For examinations in Part I. and Part II.—The attendance of some boys to act as models for bandaging (say two for every ten candidates).

21. All the arrangements for the examination should be completed at least half an hour before the time fixed for the examination to begin.

22. Candidates should be required to attend at least 5 minutes before the time fixed for the examination to begin.

23. No person other than the examiner, the candidates, the Secretary (if not a member of the teaching staff), and the boys attending for bandaging, may be admitted to the examination room. The Secretary must attend to assist the examiner, and to identify the students, and, if the Secretary is a member of the teaching staff, or a candidate for examination, a member of the Committee of Management must be appointed to act in this capacity.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

PROGRAMME FOR DAY SECONDARY SCHOOLS.

SESSION 1914-15.

EXPLANATORY CIRCULAR TO MANAGERS AND PRINCIPALS OF DAY SECONDARY SCHOOLS.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN,
August, 1914.

SIR, OR MADAM,

The Regulations for the teaching of Experimental Science, Drawing, Manual Instruction, and Domestic Economy in Day Secondary Schools which were in operation during the academic year 1913-14, will continue in force during the year 1914-15.

Since the last publication of the Programme the following Syllabuses of instruction have been revised:—

Preliminary Course in Experimental Science (Form S. 280)—*June*, 1912.

Special Course in Chemistry (Form S. 282)—*June*, 1913.

Preliminary and Special Courses in Drawing (Form S. 287)—*June*, 1912.

Auxiliary and Special Courses in Domestic Economy (Form S. 288)—*June*, 1912.

Prefatory Note to the Syllabuses in Experimental Science—*June*, 1912.

The Syllabuses of instruction for Day Trades Preparatory Schools (Circular 69) have also been revised—*August*, 1914.

The Syllabuses of the courses of instruction, as well as the Prefatory Note to the Syllabuses in Experimental Science, may be obtained separately for distribution among teachers.

A practice of permitting students, who are not of age to be eligible for grants under this Programme, to attend instruction in the First Year Syllabuses of the Preliminary Course has been observed in some schools. The Department will, as a rule, require that these students shall in future repeat the work of the First Year Syllabuses if claims in respect of their attendances at instruction in the subjects of the Programme are to be made in subsequent years. Should any such students, however, be presenting themselves for examination in the Junior Grade at the Intermediate Examinations in the year in which they will first become eligible for grants under the Programme, they will be permitted to proceed to the Second Year Syllabuses provided that the Inspector is satisfied that they have made such progress as would enable them to take, with advantage, the work of that year.

In regard to the cases of pupils who may, under Regulation III., 16, be working a second time through any Syllabus of the Programme, attention is directed to the fact that pupils who are capable of profiting by promotion to a higher course should not be permitted to repeat the previous year's course. The Department

will withhold grants in respect of instruction given to pupils who may repeat the course of any year if, in the opinion of the Instructor, those pupils had made such progress as would enable them to take with advantage, the work prescribed for the subsequent year, and in no case will pupils who were presented to the Department's Inspectors for the practical test for Honours Candidates, in connection with the examinations of the Intermediate Education Board for Ireland, be accepted for grants on account of a repetition of the same course.

The Department will require that Form S. 121, containing a list of all students following their Programme who have been registered as in attendance at instruction before the 1st November, shall be submitted by the 5th November. This form will be dealt with by the Department and returned to the Managers in order that they may furnish thereon the further information required by the Department in respect of students presenting themselves for "Experimental Science" at the examinations of the Intermediate Board.

The efficiency of instruction will, as hitherto, be tested by inspection, as a rule, without notice. It is, however, proposed that Special Inspections of a more thorough character shall be held, of which due notice will be given to the School Managers. It is intended that such inspections shall not, as a rule, be held more frequently than once in three years for any one school. During the latter part of the school session notice will be given of a visit mainly for the purpose of holding the qualifying practical tests for candidates for Honours in the subjects of the Programme at the Intermediate Examinations. This visit may, however, be dispensed with where there are no Honours Candidates to be presented. At any visit it will be within the discretion of the Inspector to test any or all of the classes by practical exercises in the laboratory; by the examination of note books, etc.; by *viva voce* examination of classes or of individuals; by written examinations, or by a combination of these methods.

It should be observed that the rates of payment may be increased by one-tenth or reduced by one or more tenths, as the Department, on consideration of the Inspector's report, may determine. Reduction by more tenths than one will be exceptional. In cases in which such exceptional treatment is necessary, the Department will consider the desirability of removing the School from the list of those aided by their grants.

The Department reserve the right to withdraw recognition of a teacher's qualifications should circumstances occur to render such a course desirable.

The details of the arrangements by which schools and pupils may obtain recognition under the regulations of the Intermediate Education Board for proficiency in Experimental Science, Drawing, and Domestic Economy, as well as the conditions required for a pass in these subjects, are published in the Rules of that Board.

I am,
Sir, or Madam,
Your obedient Servant,
T. P. GILL,
Secretary.

CIRCULAR 69.
(*Revised.*)

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET,
DUBLIN, *August*, 1914.

DAY TRADES PREPARATORY SCHOOLS.

SIR,

In view of the experience gained in connection with Day Trades Preparatory Schools, the Department feel that the time has come when they should issue some further indication of the scope and nature of the work that should be carried out in these institutions, and they have accordingly prepared syllabuses and notes on the teaching of the subjects in which instruction is usually given (*copies of these syllabuses and notes may be obtained upon application to the Department's Offices*). The Department believe that these suggestions, which have already been adopted in certain Day Trades Preparatory Schools, may with advantage be followed in most of these schools in the country. They will be prepared, however, to accept alternative syllabuses which have been drawn up to suit special local requirements, in which case they will look for a standard and amount of work equivalent to that indicated in the appendix to this circular letter.

I am,
Sir,
Your obedient Servant,
T. P. GILL,
Secretary.

TO THE SECRETARY
OF THE COMMITTEE NAMED IN THE ADDRESS.

CIRCULAR 87.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET,
DUBLIN, *October*, 1914.

No. T. 9944/14.

SIR,

I have to inform you that the Department have revised the procedure to be adopted for the submission of Proposals and Time Tables in connection with Technical Schools to be conducted under Section II. (*a*) of their Programme for Technical Schools and Classes. In future, the procedure to be followed will be as set out below.

At least one month before the opening of the School one copy of the form of application for recognition of a Technical School (Form S. 50 (*a*)) must be forwarded to the Offices of the Depart-

ment. On this form will be shown the subjects in which it is proposed to give instruction, and the names and qualifications of the teachers by whom instruction is to be given. Upon receipt of this form the official attendance registers will be issued. The names and qualifications of teachers who may be appointed subsequently to the submission of Form S. 50 (*a*) must be notified as soon as possible to the Department, and in any case at least seven days before the first meeting of the classes which they are to conduct.

Within seven days after the opening of the School the Managers must forward to the Department ten copies (printed or typewritten) of the Time Table of all classes, showing the names of the teachers, and assistants (if any), for each class. These must be accompanied by one copy of Form S. 50 (*b*), showing the date of commencement and termination of the School Year, and the dates and duration of all holidays, as far as they can be given.

Particulars of classes which may be established subsequently to the submission of this Time Table must be notified on Form S. 50 (*c*), not later than seven days after the first meeting of the class.

Notification of alterations in the teaching staff or Time Table, of any cessation of classes, whether temporary or permanent, or of alterations in the dates of the holidays, must be sent to the Department as early as possible, and no alteration in the days or hours of meeting of classes may be put into operation without the Department's sanction, in writing, having first been obtained.

In the event of numerous changes, or additions, being made to the Time Table the Department will require amended copies to be printed or typewritten and ten copies furnished to these Offices.

It is requested that ten copies of the Time Table for the Technical School or Schools to be conducted by your Committee during the present Session may be furnished to these Offices at your early convenience.

I am,
Sir,
Your obedient Servant,
T. P. GILL,
Secretary.

THE SECRETARY,
TECHNICAL INSTRUCTION COMMITTEE.

FORM S. 314.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

SCHOLARSHIPS AT THE KILLARNEY SCHOOL OF HOUSEWIFERY.

The Department are prepared to offer to County Committees of Technical Instruction special facilities for the award of Scholarships for Girls, tenable at the Killarney School of Housewifery.

This institution is under the Department's direct control and has for its object the Training of Girls in such work as would fit them for domestic service or the care of a home.

The following are the conditions under which Scholarships may be awarded :—

1. Applicants for the Scholarships must be resident in a rural district, and must have been in regular attendance at one of the Courses of Instruction in Domestic Economy conducted by the Committee of Technical Instruction for the county, in the current or the previous session.

2. The scholars will be selected by the Department from the students nominated by County Committees of Technical Instruction. Each nomination must be accompanied by a report of the Domestic Economy Instructress upon the work of the applicant at the course of instruction attended.

3. Applicants for these Scholarships may be nominated for admission to the School on the 1st February or the 16th August. Nominations should be forwarded by County Committees so as to reach the Offices of the Department on or before the 1st of January or the 16th July.

4. The Scholarships will be tenable for the full course of training, which extends over about forty-six weeks.

5. A fee of £8, being one-half of the usual fee, will be payable by the County Committee in respect of each applicant nominated by them who is awarded a Scholarship, and the parent or guardian of the scholar will be required to pay the entrance fee of £1.

6. Scholars will be required to conform to all the conditions set forth in the School Programme.

7. The Department reserve the right to determine a Scholarship without notice upon being satisfied that its continuance is for any reason undesirable.

8. The decision of the Department in all questions arising in connection with the Scholarships shall be final.

NOTES AND MEMORANDA.

Death of Mr. J. D. Daly, M.A.

In the issue of this JOURNAL published in last April was announced the promotion to the post of Chief Clerk of the Department of Mr. James Dermot Daly, M.A., Barrister-at-Law, Senior Staff Officer. The Department deeply regret to have now to record the untimely death of this able official, who, on Sunday the 11th October, after a very brief illness, passed away at the age of forty-six years.

Mr. Daly was the only son of the late Mr. James Daly, J.P., of Castle Daly, Co. Galway. He was educated at Tullabeg and Clongowes, and at University College, Dublin. Graduating in 1889 he obtained the Degree of Master of Arts in 1890, and was called to the Irish Bar in 1897.

Mr. Daly was a man of exceptional gifts for administration and fine personal qualities, which won him the respect and regard of all who came in contact with him. These gifts he had considerable opportunity of proving in the responsible duties entrusted to him during his successful career in the Department. He was a member of the Department's staff from its formation in 1900. Amongst other duties, before becoming Chief Clerk on the retirement of Mr. Cantrell, I.S.O., he acted as Secretary to the Agricultural Board, to the Board of Technical Instruction and to the Council of Agriculture, and he was for a time Private Secretary to the Secretary of the Department. He was brought much into contact with the educational work of the Department, in regard to which a rather unusual experience of educational commissions was of special advantage to him. He had been Secretary to the Commission on Manual and Practical Instruction in Irish Primary Schools of 1897, and also Secretary to the Intermediate Education (Ireland) Commission of 1898. While in the service of the Department he acted as Secretary to the Royal Commission on University Education in Ireland, 1902, and as Secretary to the Royal Commission on Trinity College, Dublin, 1906. All of these Commissions recorded their high opinion of his remarkable ability and zeal. He was one of the Trustees of the Coyne Scholarship Fund; he had been intimately associated from school-days with Dr. Coyne, another distinguished officer of the Department carried away by an untimely death. He was a man of modest and unselfish character, and high sense of public and private duty; always doing good; always, whether at his home at Castle Daly or in Dublin, helping some friend or promoting some scheme for the benefit of his fellows. The public service of Ireland is much the poorer through his loss.

Scholarships in Agriculture.

As a result of the recent examination, at which 65 candidates presented themselves, the following have been awarded scholarships in Agriculture tenable at the Royal College of Science, Dublin:—

Collins, Richard, Corballis, Donabate, Co. Dublin.
Corcoran, William J., Castleknock, Co. Dublin.
Cotter, Nicholas P., Feale View, Kilconlea, Abbeyfeale.
Delaney, Denis, Codrum, Macroom.
Kingston, James, Burgatia, Roscarbery, Co. Cork.
Molloy, Denis, Leamagowra, Ardara, Co. Donegal.
O'Flaherty, Manasses X., Carrick, Castlefin, Co. Donegal.
Roche, Carthage, Moorehill, Tallow.

Seven of the successful candidates had taken out courses of training at the Albert Agricultural College, or at one of the Department's Agricultural Stations. Of these seven four were former students of Winter Agricultural Classes under the Department's Scheme.

Each scholarship entitles the holder to (1) free admission to the first year's course of instruction at the College, (2) third class railway fare for one journey to and from the College in each session, and (3) either of the following, at the option of the Department; (*a*) a maintenance allowance of one guinea per week while in attendance at the College, or (*b*) free board and residence at the Albert Agricultural College, Glasnevin, Dublin, together with a small grant towards the cost of books and apparatus.

A scholarship is tenable for one year, but if satisfactory progress is made, it will be renewed for a second, a third and a fourth year, to enable the holder to complete the course at the College.

These scholarships are intended principally to afford the sons of Irish farmers an opportunity for training for County Instructorships or Teacherships under the Department's Agricultural Programme, and special importance is attached to proficiency in practical agriculture.

The Agricultural Faculty at the Royal College of Science was established by the Department in the year 1900. Since then there has been an increasing demand for these scholarships. Already upwards of 90 young Irishmen, who have passed successfully through their course in this Faculty have received appointments as County Agricultural Instructors, Teachers, etc.

Scholarships in Horticulture, Forestry and Creamery Management, tenable at the Royal College of Science, are also offered by the Department.

Particulars as to the subjects of examination for these scholarships in 1915 may be obtained from the Registrar, Royal College of Science, Dublin.

Pig Breeding in Ireland.

The Vice-President of the Department of Agriculture and Technical Instruction for Ireland has appointed a Committee to inquire into the present state of the pig breeding industry in Ireland, with special reference to the causes which contributed to the recent decrease in the number of pigs in Ireland ; and to submit recommendations.

The Committee consists of the following :—

JAMES SCOTT GORDON, B.Sc., Deputy Assistant Secretary in respect of Agriculture and Chief Agricultural Inspector of the Department of Agriculture and Technical Instruction for Ireland (Chairman) ;

ROBERT N. BOYD, Carntall, Carnmoney ;

PATRICK CLUNE, Department of Agriculture and Technical Instruction for Ireland ;

STEPHEN O'MARA, Strand House, Limerick ;

OLIVER W. H. ROULSTON, Department of Agriculture and Technical Instruction for Ireland ;

J. WILLINGTON, St. Kieran's, Birr.

Mr. Roulston will act as Secretary to the Committee.

The General Abstract showing the Acreage under Crops and the Numbers and Descriptions of Live Stock in Ireland in 1914 has just been published. A summary of the returns is given below :—

Corn Crops.

The following summary shows the acreage under the several corn crops in 1913 and 1914 :—

——	1913.	1914.	Increase.	Decrease.
	Acres.	Acres.	Acres.	Acres.
WHEAT,	34,004	36,913	2,909	—
OATS,	1,048,813	1,028,662	—	20,151
BARLEY AND BERE,	172,948	172,389	—	559
RYE,	6,723	7,535	812	—
BEANS,	1,264	1,234	—	30
PEASE,	211	270	59	—
TOTAL,	1,263,963	1,247,003	3,780	20,740
Net Decrease,	—	—	—	16,960

Green Crops. The following summary shows the area of green crops in 1913 and 1914, and the increase or decrease of the several crops ;—

——	1913.	1914.	Increase.	Decrease.
	Acres.	Acres.	Acres.	Acres.
Potatoes,	582,303	583,056	753	—
Turnips,	276,596	276,886	290	—
Mangels and Beet Root,	78,914	81,580	2,666	—
Carrots,	1,221	1,185	—	36
Parsnips,	561	541	—	20
Cabbage,	35,080	35,705	625	—
Vetches,	2,267	2,147	—	120
Rape,	3,132	3,464	332	—
Other Green Crops,	29,407	30,842	1,435	—
Total,	1,009,481	1,015,406	6,101	176
Net Increase,	—	—	5,925	—

Flax. The area under flax is 49,253 acres in 1914 as compared with 59,305 acres in 1913—a decrease of 10,052 acres or 16·9 per cent. The decrease is general throughout the flax-growing counties. In Antrim there is a decrease of 995 acres, in Armagh of 277 acres, in Cavan of 87 acres, in Donegal of 2,445 acres, in Down of 618 acres, in Fermanagh of 145 acres, in Londonderry of 1,940 acres, in Monaghan of 617 acres, and in Tyrone of 2,706 acres.

Fruit. The total area of fruit is returned in 1914 at 16,090 acres as compared with 15,734 acres in 1913—an increase of 356 acres or 2·3 per cent.

Live Stock. The following are the changes in the numbers of live stock in 1914 as compared with 1913 :—

——	1913.	1914.	Increase.	Decrease.
Horses,	614,482	619,028	4,546	—
Mules and Jennets,	30,338	30,942	604	—
Asses,	243,339	244,557	1,218	—
Cattle,	4,932,625	5,051,645	119,020	—
Sheep,	3,620,724	3,600,581	—	20,143
Pigs,	1,060,360	1,305,638	245,278	—
Goats,	246,348	242,243	—	4,105
Poultry,	25,701,342	26,918,749	1,217,407	—

STATISTICAL TABLES.

STATISTICAL

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned
compared with the

Kinds of Fish.	North Coast.				East Coast.			
	1914.		1913.		1914.		1913.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt	£
Brill,	4	8	3	8	11	37	3	7
Soles,	13	63	14	50	65	265	47	241
Turbot,	1	3	—	—	30	127	22	96
Total Prime Fish,	18	74	17	58	106	429	72	344
Cod,	—	—	8	10	971	1,031	805	803
Conger Eel,	—	—	—	—	280	164	600	439
Haddock,	—	—	16	10	256	260	437	404
Hake,	—	—	—	—	394	479	647	793
Herrings,	110	60	630	158	48,705	13,797	65,093	24,669
Ling,	—	—	—	—	197	86	805	581
Mackerel,	462	167	430	110	221	46	2,421	273
Plaice,	319	308	373	335	376	508	321	319
Ray or Skate,	17	2	8	7	259	132	511	369
Sprats,	—	—	—	—	—	—	—	—
Whiting,	—	—	—	—	475	373	437	406
All other except Shell Fish	950	367	319	142	955	414	802	706
Total,	1,876	978	1,801	830	53,195	17,719	72,951	30,106
SHELL FISH :—	No.		No.		No.		No.	
Crabs,	10,830	29	17,856	58	17,839	103	20,036	95
Lobsters,	23,348	666	15,024	446	14,638	451	11,688	396
	Cwt.		Cwt.		Cwt.		Cwt.	
Mussels,	—	—	—	—	70	5	50	5
	No.		No.		No.		No.	
Oysters,	—	—	—	—	—	—	—	—
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish,	20	3	71	11	279	53	467	183
Total,	—	698	—	515	—	612	—	679
Total value of Fish landed	—	1,676	—	1,345	—	18,331	—	30,785

NOTE.—The above figures are subject

TABLES.

IRELAND.

as landed on the Irish Coasts during the month of July, 1914, as corresponding period in 1913.

South Coast.				West Coast.				Total.			
1914.		1913.		1914.		1913.		1914.		1913.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
5	10	3	8	23	44	26	63	43	99	35	86
50	199	56	2[illegible]2	74	284	104	425	202	811	221	968
3	11	1	4	20	91	37	130	54	232	60	230
58	220	60	264	117	419	167	618	299	1,142	316	1,284
26	22	73	53	—	—	—	—	997	1,053	886	866
55	25	11	4	—	—	—	—	335	189	611	443
9	10	4	3	29	19	63	31	294	289	520	448
—	—	—	—	56	23	11	4	450	502	658	797
452	178	1,368	582	670	305	471	209	49,937	14,340	67,562	25,618
40	29	52	37	5	4	—	—	242	119	857	618
749	251	2,585	602	4,199	1 072	3,629	826	5 631	1,536	9,065	1,811
170	193	278	328	322	236	216	227	1,187	1,245	1,188	1,209
15	6	—	—	2	1	6	1	293	141	525	377
—	—	—	—	—	—	—	—	—	—	—	—
14	6	6	7	503	166	154	66	992	545	597	479
336	167	457	147	614	360	687	325	2 855	1.308	2,265	1 320
1,924	1,107	4,894	2,027	6,517	2,605	5,404	2,307	63,512	22,409	85,050	35,270
No.		No.		No.		No.		No.		No.	
10,696	93	9,186	122	316	2	—	—	39,681	227	47,078	275
32,012	1,196	59,517	2 229	72,885	2,347	92,494	3 318	142,883	4,660	178,723	6,389
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
—	—	—	—	58	4	48	3	128	9	98	8
No.		No.		No.		No.		No.		No.	
—	—	—	—		—	—	—	—	—	—	—
Cwts.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
120	12	140	14	208	34	258	41	627	102	936	249
—	1,301	—	2,365	—	2 387	—	3,362	—	4 998	—	6,921
—	2,408	—	4,392	—	4,992	—	5,669	—	27,407	—	42,191

to correction in Annual Returns.

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast.				East Coast.			
	1914.		1913.		1914.		1913.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill,	5	8	2	4	10	29	12	30
Soles,	21	88	12	46	48	202	46	184
Turbot,	7	20	4	12	30	131	22	109
Total Prime Fish,	33	116	18	62	88	362	80	323
Cod,	—	—	7	8	550	698	533	536
Conger Eel,	—	—	—	—	318	203	415	328
Haddock,	—	—	6	4	70	132	279	250
Hake,	—	—	—	—	258	390	426	532
Herrings,	5	4	1,095	559	20,977	6,908	61,736	26,096
Ling,	—	—	—	—	196	91	531	434
Mackerel,	77	35	101	21	294	45	1,677	210
Plaice,	311	300	382	350	445	742	290	307
Ray or Skate,	86	21	3	3	373	205	381	293
Sprats,	—	—	—	—	—	—	—	—
Whiting,	—	—	—	—	432	551	279	236
All other except Shell Fish	—	—	220	102	717	403	688	607
Total,	512	476	1,832	1,109	24,718	10,735	67,315	30,152
SHELL FISH :—	No.		No.		No.		No.	
Crabs,	3,030	36	15 864	40	15,456	93	13,470	71
Lobsters,	10,344	228	24,496	718	11,643	258	14,025	511
	Cwt.		Cwt.		Cwt.		Cwt.	
Mussels,	—	—	—	—	184	28	—	—
	No.		No.		No.		No.	
Oysters,	—	—	—	—	—	—	—	—
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish,	—	—	103	15	86	26	380	162
Total,	—	264	—	773	—	405	—	744
Total value of Fish landed	—	740	—	1,882	—	11,140	—	30,896

NOTE.—The above figures are subject

IRELAND.

as landed on the IRISH COASTS during the month of August, 1914, as corresponding period in 1913.

South Coast.				West Coast.				Total.			
1914.		1913.		1914.		1913.		1914.		1913.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
11	21	2	5	19	29	7	15	45	87	23	54
31	122	41	158	63	232	73	277	163	644	172	665
3	11	—	—	22	92	30	106	62	254	56	227
45	154	43	163	104	353	110	398	270	985	251	946
16	15	25	12	—	—	—	—	566	713	565	556
13	6	19	6	—	—	—	—	331	209	434	334
—	—	—	—	52	42	63	35	122	174	348	289
—	—	—	—	—	—	—	—	258	399	426	532
550	154	627	191	334	166	1,015	502	21,866	7,232	64,473	27,348
14	11	66	33	—	—	—	—	210	102	597	467
214	84	310	127	427	126	993	280	1,012	290	3,081	638
96	113	255	289	130	115	87	89	982	1,270	1,014	1,035
2	1	—	—	—	—	—	—	461	227	384	296
3	1	371	37	—	—	—	—	3	1	371	37
1	1	—	—	162	74	142	57	595	626	421	293
204	94	304	168	386	214	463	278	1,307	716	1,675	1,155
1,158	634	2,020	1,026	1,595	1,090	2,873	1,639	27,983	12,935	74,040	33,926
No.		No.		No.		No.		No.		No.	
2,368	19	3,968	33	—	—	—	—	20,854	148	33,302	144
11,449	393	53,861	1,846	39,044	1,122	75,436	2,713	72,480	2,001	167,818	5,788
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
—	—	—	—	110	8	222	13	294	36	222	13
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	—	—	—	—
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
70	7	160	16	390	66	146	26	546	99	789	219
—	419	—	1,895	—	1,196	—	2,752	—	2,284	—	6,164
—	1,053	—	2,921	—	2,286	—	4,391	—	15,219	—	40,090

to correction in Annual Returns.

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. 1914. Quantity.	North Coast. 1914. Value.	North Coast. 1913. Quantity.	North Coast. 1913. Value.	East Coast. 1914. Quantity.	East Coast. 1914. Value.	East Coast. 1913. Quantity.	East Coast. 1913. Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, ...	2	3	2	3	8	21	3	7
Soles, ...	9	49	5	25	52	276	27	120
Turbot, ...	1	4	1	2	24	114	15	71
Total Prime Fish,	12	56	8	30	84	411	45	198
Cod, ...	3	2	22	20	875	1,098	249	259
Conger Eel, . . .	—	—	—	—	438	273	143	129
Haddock, ...	—	—	—	—	47	62	106	114
Hake, ...	—	—	—	—	363	515	190	259
Herrings, ...	10,062	3,498	3 159	1,508	10.032	3,144	28,177	11.441
Ling, ...	—	—	—	—	107	63	201	169
Mackerel, ...	19	13	163	31	110	43	377	85
Plaice, ...	235	219	311	298	807	1.101	258	283
Ray or Skate, .	106	26	84	21	759	364	204	175
Sprats, ...	—	—	—	—	—	—	—	—
Whiting, ...	—	—	—	—	493	504	120	118
All other except Shell Fish	8	3	306	139	840	418	441	473
Total, . .	10,445	3,817	4,053	2,047	14,955	7,996	30,511	13,703
SHELL FISH :— . .	No.		No.		No.		No.	
Crabs, . . .	1,390	17	16,428	39	5,347	49	4 522	28
Lobsters, . .	10,121	231	20,600	621	4,559	130	8,710	314
	Cwt.		Cwt.		Cwt.		Cwt.	
Mussels, . .	—	—	—	—	27	4	446	39
	No.		No.		No.		No.	
Oysters, . .	—	—	—	—	2,744	4	3,150	6
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish, .	—	—	8	1	115	32	107	45
Total, . .	—	248	—	661	—	219	—	432
Total value of Fish landed	—	4 065	—	2,708	—	8,215	—	14,135

NOTE.—The above figures are subject

IRELAND.

as Landed on the Irish Coasts during the month of September, 1914, as corresponding period in 1913.

South Coast				West Coast.				Total.			
1914.		1913.		1914.		1913.		1914.		1913.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
2	3	2	5	20	36	14	32	32	63	21	47
25	96	55	200	100	408	75	292	186	829	162	637
1	2	1	2	31	120	26	121	57	240	43	196
28	101	58	207	151	564	115	445	275	1,132	226	880
2	1	22	8	—	—	19	5	880	1,101	312	292
3	1	17	5	—	—	—	—	441	274	160	134
—	—	—	—	97	66	89	80	144	128	195	194
—	—	2	1	50	15	205	75	413	530	397	335
1,714	622	1,514	481	1,148	436	4 609	1,875	22,956	7,700	37,459	15,305
—	—	11	11	25	9	—	—	132	72	212	180
3.327	872	3,632	711	2,996	1,330	2,798	982	6,452	2,258	6 970	1,809
108	133	256	281	76	73	143	119	1,226	1,526	968	981
6	3	—	—	159	33	—	—	1,030	426	288	196
—	—	4	2	—	—	—	—	—	—	4	
12	7	—	—	160	146	344	136	665	657	464	254
393	157	365	142	288	129	357	196	1,519	707	1,469	950
5,583	1.897	5,881	1,849	5,150	2,801	8,679	3,913	36,133	16,511	49,124	21,512
No.		No.		No.		No.		No		No.	
1,032	9	1,202	10	—	—	216	1	7,769	75	22,368	78
2.683	100	21,313	772	9,964	250	36,005	1,328	27,327	711	86,628	3,035
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
—	—	60	8	207	15	660	44	234	19	1.166	91
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	2,744	4	3.150	6
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
100	10	300	30	686	117	236	38	901	159	651	114
—	119	—	820	—	382	—	1,411	—	968	—	3,324
—	2.016	—	2,669	—	3,183	—	5,324	—	17,479	—	24,836

to correction in Annual Returns.

Statement of the Total Quantity of Fish landed on the English and Welsh Coasts during the Month and Nine Months ended 30th September 1914, compared with the corresponding periods of the Year 1913.

Kinds of Fish.	September.		Nine months ended 30th September.	
	1914.	1913.	1914.	1913.
	Quantity.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill,	1,138	1,674	15,046	14,148
Soles,	4,154	5,313	49,616	48,814
Turbot,	1,832	4,751	48,709	46,821
Prime Fish not separately distinguished,	—	419	1,082	2,056
Total Prime Fish,	7,124	12,157	114,453	111,839
Bream,	10,623	13,858	71,829	76,151
Catfish,	22,145	21,960	134,037	144,797
Coalfish,	39,263	35,405	366,997	310,200
Cod,	127,099	166,890	2,188,810	2,115,125
Conger Eels,	5,208	4,053	45,887	39,919
Dabs,	7,633	9,258	76,705	77,202
Dogfish,	2,022	2,802	26,796	32,371
Dory,	124	162	1,674	1,641
Flounders or Flukes,	302	589	5,856	4,774
Gurnards,	10,193	7,825	80,969	75,577
Haddock,	108,782	146,728	996,848	1,221,319
Hake,	40,634	57,928	498,361	526,121
Halibut,	8,848	10,124	68,961	90,800
Latchets (Tubs),	174	242	2,305	1,784
Lemon Soles,	3,394	6,110	38,981	48,375
Ling,	13,959	16,583	159,384	173,108
Megrims,	9,647	6,745	62,921	56,990
Monks (or Anglers),	3,047	2,508	26,068	27,930
Mullet (Red),	—	3	71	191
Plaice,	29,038	62,027	470,084	501,200
Pollack	455	651	10,770	11,014
Skates and Rays,	26,888	28,901	276,208	272,005
Torsk,	3,743	4,847	23,654	25,013
Whiting,	18,978	42,078	305,804	310,360
Witches,	3,736	1,766	26,823	27,990
Herrings,	237,884	591,454	716,201	1,779,353
Mackerel,	10,303	8,556	257,314	279,027
Mullet (Grey)	12	37	401	520
Pilchards,	27,633	14,943	38,084	42,436
Sprats,	241	—	49,356	19,426
Whitebait,	17	4	3,156	4,562
Fish not separately distinguished,	14,399	31,787	281,593	271,810
Total Wet Fish,	793,548	1,308,981	7,427,361	8,680,930
Shell Fish:—	No.	No.	No.	No.
Crabs,	218,391	253,463	4,545,491	5,287,771
Lobsters,	35,168	45,997	558,187	584,199
Oysters,	1,727,611	3,077,150	16,165,688	17,071,826
	Cwts.	Cwts.	Cwts.	Cwts.
Other Shell Fish,	42,319	58,988	397,950	385,373

Note.—The figures for 1914 are subject to correction.

STATEMENT of the TOTAL VALUE of FISH landed on the ENGLISH and WELSH COASTS during the Month and Nine Months ended 30th September, 1914, compared with the corresponding periods of the Year 1913.

KINDS OF FISH.	September.		Nine months ended 30th September.	
	1914.	1913.	1914.	1913.
	VALUE.			
	£	£	£	£
Brill,	**4,182**	6,787	**49,616**	51,143
Soles,	**26,111**	38,297	**320,587**	341,485
Turbot,	**9,193**	21,832	**198,465**	205,264
Prime Fish not separately distinguished,	—	635	**1,712**	3,183
Total Prime Fish,	**39,486**	67,551	**570,380**	601,075
Bream,	**2,889**	2,104	**24,899**	20,073
Catfish,	**10,074**	10,032	**60,058**	51,731
Coalfish,	**16,296**	12,601	**112,272**	92,805
Cod,	**107,428**	118,050	**1,342,354**	1,271,622
Conger Eels,	**3,354**	2,947	**31,414**	28,684
Dabs,	**7,536**	7,283	**75,396**	72,460
Dogfish,	**850**	824	**9,065**	11,974
Dory,	**142**	180	**1,565**	1,625
Flounders or Flukes,	**303**	633	**4,300**	3,688
Gurnards,	**2,640**	2,510	**25,951**	23,783
Haddock,	**84,351**	115,941	**830,792**	1,002,740
Hake,	**56,177**	74,228	**544,867**	525,811
Halibut,	**25,826**	31,873	**226,428**	288,893
Latchets (Tubs),	**96**	114	**1,325**	933
Lemon Soles,	**10,242**	16,384	**111,752**	125,447
Ling,	**6,844**	8,727	**81,356**	83,601
Megrims,	**9,183**	4,743	**56,706**	47,683
Monks (or Anglers),	**1,845**	1,267	**16,085**	15,426
Mullet (Red),	—	10	**230**	634
Plaice,	**55,912**	95,290	**689,993**	739,871
Pollack,	**341**	406	**7,598**	7,292
Skates and Rays,	**19,913**	21,320	**211,746**	191,061
Torsk,	**2,002**	1,730	**10,420**	9,565
Whiting,	**12,758**	22,149	**208,190**	202,712
Witches,	**4,655**	1,965	**33,464**	35,966
Herrings,	**110,054**	267,881	**279,574**	745,219
Mackerel,	**4,327**	5,093	**129,441**	132,892
Mullet (Grey),	**57**	109	**982**	1,253
Pilchards,	**8,902**	6,648	**13,470**	17,510
Sprats,	**48**	—	**9,910**	4,397
Whitebait	**20**	8	**6,828**	10,288
Fish not separately distinguished,	**5,544**	16,796	**166,335**	174,225
Total, Wet Fish	**610,095**	917,397	**5,895,146**	6,542,939
Shell Fish:—				
Crabs,	**2,283**	3,212	**50,106**	57,754
Lobsters,	**1,466**	2,422	**27,495**	28,195
Oysters,	**5,897**	11,111	**47,454**	52,337
Other Shell Fish,	**10,678**	15,409	**92,182**	103,787
Total Shell Fish,	**20,324**	32,154	**217,237**	242,073
Total Value	**630,419**	949,551	**6,112,383**	6,785,012

NOTE—The figures for 1914 are subject to correction.

Statement of the **Total Quantity** of the **Fish** landed on the **Scottish Coasts** during the Month and Nine Months ended 30th September, 1914, compared with the corresponding periods of the year 1913.

Kinds of Fish.	September		Nine Months ended 30th September.	
	1914.	1913.	1914.	1913.
	Quantity			
	Cwt.	Cwt.	Cwt.	Cwt.
Herrings	**54,063**	189,977	**4,247,142**	4,327,225
Sprats	**407**	69	**5,347**	2,648
Sparlings	**95**	66	**215**	136
Mackerel	**5,885**	4,381	**67,592**	67,364
Cod Codling	**39,018**	42,003	**568,841**	731,011
Ling	**19,508**	18,535	**173,135**	176,061
Torsk (Tusk)	**1,366**	1,206	**15,388**	15,133
Saith (Coal Fish)	**14,680**	14,833	**232,758**	258,157
Haddocks, Extra Large Do. Large Do. Medium Do. Small	**53,085**	55,080	**401,986**	499,348
Whitings	**17,176**	18,385	**186,736**	147,265
Conger Eels	**1,926**	599	**22,670**	20,306
Gurnards	**1,446**	729	**5,186**	4,303
Catfish	**874**	1,118	**24,716**	23,020
Monks (Anglers)	**1,813**	2,205	**17,530**	16,407
Hake	**1,662**	1,056	**17,331**	8,096
Squids	**4**	—	**16**	9
Turbot	**268**	316	**3,203**	2,820
Halibut	**4,758**	5,637	**37,607**	40,345
Lemon Soles	**3,356**	3,765	**24,317**	28,477
Flounders	**546**	938	**5,768**	6,597
Plaice, Large Do. Medium Do. Small	**8,205**	4,401	**36,611**	31,201
Brill	**58**	17	**320**	117
Dabs	**1,398**	766	**7,701**	6,426
Witches	**1,332**	2,429	**15,565**	18,633
Megrims	**715**	1,189	**12,554**	12,067
Skates and Rays	**7,767**	9,670	**127,143**	108,912
Unclassified kinds	**606**	838	**7,157**	10,968
Total	**242,017**	380,208	**6,264,535**	6,563,052
	No.	No.	No.	No.
Shell Fish :—				
Crabs	**84,056**	128,427	**1,385,830**	1,979,285
Lobsters	**75,766**	95,354	**477,873**	489,998
Oysters	**44,900**	125,084	**527,240**	868,344
	Cwt.	Cwt.	Cwt.	Cwt.
Clams	**315**	316	**29,364**	7,339
Mussels	**13,668**	6,735	**90,203**	51,426
Unclassified	**2,131**	2,695	**28,800**	32,592

Note.—The above figures are subject to correction in the Annual Returns.

Statement of the TOTAL VALUE of the FISH landed on the SCOTTISH COASTS during the Month and Nine Months ended 30th September, 1914, compared with the corresponding periods of the year 1913.

KINDS OF FISH.	September.		Nine Months ended 30th September.	
	1914.	1913.	1914.	1913.
	Value			
	£	£	£	£
Herrings	17,756	90,067	1,276,136	2,029,988
Sprats	80	23	643	458
Sparlings	176	213	576	441
Mackerel	1,494	773	12,623	8,437
Cod, Codling	28,524	27,992	330,816	351,689
Ling	5 965	7,176	63,319	64,361
Torsk (Tusk)	661	499	5,535	5,308
Saith (Coal Fish)	3,365	3,022	44,878	38,519
Haddocks, Extra Large; Do. Large; Do. Medium; Do. Small	37,481	41,492	327,100	375,206
Whitings	10,529	6,935	104,985	63,055
Conger Eels	691	304	10,202	9,115
Gurnards	142	91	794	668
Catfish	283	412	7,371	6,134
Monks (Anglers)	425	504	4,722	4,431
Hake	1,376	697	12,766	5,523
Squids	—	—	1	—
Turbot	818	1,109	9,382	9,447
Halibut	10,663	13,319	88,463	89,833
Lemon Soles	9,079	8,970	63,163	63,129
Flounders	505	555	4,444	4,118
Plaice, Large; Do. Medium; Do. Small	12,924	7,049	61,809	49,501
Brill	120	37	555	250
Dabs	687	317	3,492	2,508
Witches	1,827	2,237	18,757	18,827
Megrims	1,188	1,695	17,520	15,335
Skates and Rays	2,141	2,156	36,941	28,304
Unclassified kinds	127	129	1,086	1,372
Total	149,027	217,683	2,508,079	3,245,957
Shell Fish :—				
Crabs	559	908	11,269	12,941
Lobsters	2,152	4,582	23,606	25,461
Oysters	179	456	1,979	3,089
Clams	47	47	878	960
Mussels	704	359	4,991	2,876
Unclassified	961	948	9,345	8,951
Total	4,602	7,300	52,068	54,278
Total Value of all Fish	153,629	224,983	2,560,147	3,300,235

NOTE.—The above figures are subject to correction in the Annual Returns.

STATEMENT of the TOTAL QUANTITY and VALUE of the FISH returned as landed on the IRISH COASTS during the Month and Nine Months ended 30th September, 1914, compared with the corresponding periods of the Year 1913.

Kinds of Fish.	September.		Nine Months ended 30th September.	
	1914.	1913.	1914.	1913.
	QUANTITY.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill,	32	21	348	355
Soles,	186	162	1,427	1,686
Turbot,	57	43	441	449
Total Prime Fish,	275	226	2,216	2,490
Cod,	880	312	16,510	17,498
Conger Eel,	441	160	3,685	4,830
Haddock,	144	195	2,944	9,509
Hake,	413	397	3,325	5,052
Herrings,	22.956	37,459	241,708	366,839
Ling,	132	212	2,955	7,054
Mackerel,	6,452	6,970	138,706	84,013
Plaice,	1,226	968	8,537	8,767
Ray or Skate,	1,030	288	5,419	5,872
Sprats,	—	4	80	391
Whiting,	325	464	7,154	6,456
Fish not separately distinguished, except Shell Fish,	1,519	1,469	12,491	14,198
Total,	36,133	49,124	445,730	532,969
Shell Fish :—	No.	No.	No.	No.
Crabs,	7,769	22,368	136,443	187,664
Lobsters,	27,327	86,628	396,183	540,747
	Cwts.	Cwts.	Cwts.	Cwts.
Mussels,	234	1,166	5,467	7,486
	No.	No.	No.	No.
Oysters,	2,744	3,150	150,053	79,720
	Cwts.	Cwts.	Cwts.	Cwts.
Other Shell Fish,	901	651	8,070	12,983
	VALUE.			
	£	£	£	£
Brill,	63	47	847	872
Soles,	829	637	6,165	7,505
Turbot,	240	196	1,983	1,975
Total Prime Fish,	1,132	880	8,995	10,352
Cod,	1,101	292	13,838	13,764
Conger Eel,	274	134	2,510	3,656
Haddock,	128	194	2,611	6,236
Hake,	530	335	4,247	6,154
Herrings,	7,700	15,305	78,156	139,429
Ling,	72	180	2,137	5,345
Mackerel,	2,258	1,809	38,796	24,819
Plaice,	1,526	981	9,957	8,815
Ray or Skate,	426	196	2,495	3,049
Sprats,	—	2	17	43
Whiting,	657	254	5,566	4,894
Fish not separately distinguished, except Shell Fish	707	950	6,469	9,160
Total,	16,511	21,512	175,794	235,716
Shell Fish :—				
Crabs,	75	78	794	1,016
Lobsters,	711	3,035	13,263	19,595
Mussels,	19	91	716	1,057
Oysters,	4	6	233	151
Other Shell Fish,	159	114	1,931	2,730
Total,	968	3,324	16,937	24,549
Total Value of Fish landed,	17,479	24,836	192,731	260,265

NOTE.—The above figures are subject to correction in the Annual Returns.

Quarterly Average Prices of Crops, Live Stock, Meat, Provisions, &c., for the Quarter ended 30th September, 1914

Product.	Province. Leinster.	Munster.	Ulster.	Connaught.	Ireland. 1914.	1913.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Crops :—						
Wheat, . . per 112 lbs.	9 1	9 3½	—	—	9 1¼	7 9½
Oats (White) . „	7 11½	7 5½	7 11	7 5¾	7 8½	6 6
„ (Black) . „	7 8¾	6 8½	—	—	6 9	5 7½
Barley, . . „	8 0	7 5	—	—	7 6½	7 8½
Potatoes . „	4 0½	5 5	2 10¾	3 11	4 1½	4 2½
Hay (Clover) . „	3 10	3 5	3 2½	3 7¾	3 5¾	2 10½
„ (Meadow) „	2 8	2 11	—	2 5½	2 9½	2 3
Grass Seed—						
(Perennial Rye) „	—	—	6 3½	—	6 3½	10 7½
(Italian Rye) . „	—	—	7 4½	—	7 4½	13 7½
Flax . . per 14 lbs.	—	—	9 5½	—	9 5½	6 8½
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Live Stock :—						
Calves (young) per head	2 13 6	2 4 9	1 14 3	2 16 3	2 7 9	2 9 4
Store Cattle—						
Over 6 and not exceeding 12 months per head	5 15 6	4 9 3	5 14 0	5 14 3	5 2 9	5 2 2
One year old and under two years per head	9 1 6	7 17 9	8 5 6	9 1 9	8 8 0	8 4 0
Two years old and under three years per head	12 12 6	10 0 0	10 16 6	12 14 0	11 8 3	11 1 10
Three years old and over „	15 1 0	9 11 3	12 4 0	14 17 0	12 4 6	11 2 1
Fat Cattle—						
Two years old and under three years per head	15 5 3	14 4 6	15 2 9	15 14 9	14 19 6	15 0 5
Three years old and over „	17 9 9	15 18 9	—	17 2 3	16 14 9	16 18 7
Cows and Bulls per head	14 12 6	13 4 0	13 4 9	13 15 3	13 6 9	13 1 4
Springers—						
Cows and Heifers per head	15 9 6	12 18 0	14 18 0	15 16 9	14 15 6	15 7 6
Milch Cows (down calved) „	14 0 6	12 16 3	13 10 6	13 16 0	13 13 9	14 2 10
Lambs (under 12 months old) per head	1 7 9	1 7 6	1 2 9	1 6 9	1 6 9	1 6 0
Store Sheep—						
One year old and under two years per head	1 14 6	1 7 0	1 5 6	2 0 0	1 12 6	1 10 8
Two years old and over „	1 14 9	1 3 6	1 3 6	2 4 6	1 16 9	1 15 10
Fat Sheep—						
One year old and under two years per head	2 1 6	2 3 3	1 19 6	2 8 6	2 3 0	2 2 5
Two years old and over „	2 2 9	1 17 6	2 1 3	2 14 3	2 3 0	2 2 7
Young Pigs—						
8 to 10 weeks old „	1 1 6	1 6 9	1 7 9	1 7 0	1 6 0	1 12 5
Store Pigs—						
10 weeks to 4 months old „	1 12 3	1 6 6	—	—	1 10 0	1 16 3
4 months old and over „	2 3 9	1 15 3	—	—	1 17 6	2 3 5
Fat Pigs . . „	4 12 3	4 1 9	—	5 4 9	4 17 3	5 1 10
Sows, . . . „	—	6 6 0	5 16 9	7 5 3	6 9 9	6 18 4
Meat, Provisions, &c.						
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Beef (Live) . per 112 lbs.	—	—	—	—	36 3	35 3
„ (Dead) . „	—	—	—	—	63 6	61 8
Mutton (Live) . „	—	—	—	—	36 6	36 0
„ (Dead) „	—	—	—	—	64 0	63 0
Pork (Dead) . „	53 11	61 0	56 7	58	60 6	66 9
Butter (Creamery) „	118 2	116 5	—	—	116 7	107 0
„ (Factory) „	100 7	97 9	—	—	97 10	93 3
„ (Farmers') „	97 10	98 7	104 5	100 11	98 11	90 4
Eggs . . per 120	10 10½	9 10¾	—	9 5¾	10 3	9 8½
Wool per lb.	1 0¼	1 0¼	—	1 0¾	1 0¼	0 11¾

Weekly Average Prices of Wheat, Oats, and Barley, per 112 lbs. computed from Market Returns of certain quantities of these Cereals supplied by Officers of Customs and Excise, during the Quarter ended 30th Septemb r, 1914.

Returns received in the Week ended	Wheat.		Oats		Barley.	
	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity
1914.	*s. d.*	Cwts. of 112 lbs.	*s. d.*	Cwts. of 112 lbs.	*s. d.*	Cwts. of 112 lbs.
July 4	—	—	7 5¼	1,203	—	—
„ 11	—	—	7 4¾	1,344	—	—
„ 18	—	—	7 1¼	1,647	—	—
„ 25	—	—	7 3¾	2,040	—	—
August 1	—	—	7 3¼	1,331	—	—
„ 8	—	—	8 2½	831	—	—
„ 15	—	—	8 10	1,631	—	—
„ 22	—	—	8 0¾	4,358	—	—
„ 29	—	—	7 3	4,552	—	—
September 5	—	—	7 1¼	10,956	—	—
„ 12	9 2¾	568	6 11½	20,291	—	—
„ 19	—	—	6 10¾	20,773	7 5½	3,400
„ 26	9 1	2,231	7 0	14,290	7 6¾	3,244

Quarterly Average Prices of Fat Cattle and Fat Sheep, per 112 lbs., Live Weight, sold in Dublin Markets during the period ended 30th September, 1914, and also for the corresponding period during seventeen preceding years.

Year.	Fat Cattle.	Fat Sheep.	Year.
	£ *s.* *d.*	£ *s.* *d.*	
1914,	1 16 3	1 16 6	1914.
1913,	1 15 3	1 16 0	1913.
1912,	1 11 0	1 8 10	1912.
1911,	1 12 7	1 11 7	1911.
1910,	1 15 5	1 13 6	1910.
1909,	1 13 4	1 10 0	1909.
1908,	1 12 4	1 15 8	1908.
1907,	1 11 8	1 18 5	1907.
1906,	1 10 3	1 17 8	1906.
1905,	1 10 6	1 15 1	1905.
1904,	1 11 7	1 15 10	1904.
1903,	1 11 10	1 13 1	1903.
1902,	1 13 10	1 12 1	1902.
1901,	1 11 6	1 12 1	1901.
1900,	1 12 7	1 14 5	1900.
1899,	1 11 0	1 13 2	1899.
1898,	1 9 1	1 11 4	1898.
1897,	1 9 11	1 12 10	1897.

NUMBER of ANIMALS included in Returns furnished under the MARKETS and FAIRS (Weighing of Cattle) ACT, 1891, Sections 3 and 4, during the Quarter ended 30th September, 1914.

Week Ended	Fat Cattle.					Fat Sheep.			
	Dublin.		Belfast.		Total Number of Cattle included in Returns.	Dublin.		Belfast.	Total Number of Sheep included in Returns.
	Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	Mr. John Robson, Auctioneer.		Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	
1914.									
July 2	74	92	77	34	277	—	363	—	363
„ 9	81	166	69	29	345	—	401	—	401
„ 16	58	177	75	21	331	—	336	—	336
„ 23	48	39	69	54	210	—	111	—	111
„ 30	46	97	71	86	300	—	248	—	248
August 6	79	154	70	35	338	—	260	—	260
„ 13	63	125	65	37	290	—	90	—	90
„ 20	85	146	69	54	354	—	190	—	190
„ 27	49	250	73	66	438	—	246	—	246
September 3	65	178	70	40	353	—	421	—	421
„ 10	75	321	67	72	535	—	203	—	203
„ 17	88	299	74	45	506	—	401	—	401
„ 24	78	195	66	45	384	10	304	—	314
Totals,	889	2,239	915	618	4,661	10	3,574	—	3,584

BUTTER PRICES DURING THE QUARTER

ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW,"

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the
an Irish Creamery would be 5*s*. to 7*s*. per cwt. less than
freight, commission,

Country of Origin	Type of Package.	Place of Sale.	Week Ended July 4th.	11th.	18th.	25th.
			Per cwt s. s.	Per cwt s. s.	Per cwt. s. s.	Per cwt s. s.
Ireland—Creamery Butter,	Kiels, kegs, or pyramid boxes	London, .	110–114	112–116	114–118	116–122
		Liverpool, .	106–112	109–115	111–117	115–121
		Bristol, .	110–114	112–116	114–118	118–124
		Cardiff, .	112–116	113–118	115–120	116–123
		Manchester, .	109–114	112–116	114–119	119/6–123/6
		Birmingham, .	111–112	115–116	117–118	120–121
		Glasgow, .	110–112	112–114	116–118	120–122
		Limerick, .	—	—	—	—
		Cork, .	—	—	—	—
		Belfast, .	—	—	—	—
		Dublin, .	109/8	109/8–112	112–114/4	118–119
	1lb. rolls, in boxes, Salted or Unsalted.	F.O.R., .	112–121/4	116/8–121/4	121/4–126	121/4–126
Factories, .		London, .	96–107	96–109	98–110	98–110
		Liverpool, .	95–102	96–100	96–102	100–104
		Bristol, .	96–104	96–104	96–104	96–106
		Cardiff, .	96–104	96–101	96–103	98–104
		Manchester, .	—	—	—	—
Farmers' Butter,	Firkins 1st, Export Price	Cork, .	94–95	95	95–96	96
	Do. 2nd „	Cork, .	92–93	92–93	92–95	95
	Do. 3rd „	Cork, .	—	—	—	92
	Fresh, .	Cork, .	97	97	97–102	100–104
France, .	12×2lb. rolls,	London, .	Per doz. lbs. 10/6–13	Per doz. lbs. 10/6–13/6	Per doz. lbs. 11–14	Per doz. lbs. 11–14
	Paris baskets,	do., .	Per cwt. 104–114	Per cwt. 108–118	Per cwt. 112–122	Per cwt. 112–122
Denmark and Sweden		Copenhagen Quotation.	102 Kr. per 50 Kilos = 113/10 per cwt.	104 Kr. per 50 Kilos = 116/1 per cwt.	108 Kr. per 50 Kilos = 120/7 per cwt.	111 Kr. per 50 Kilos = 124/– per cwt.
		Average over-price	—	—	—	—
	Kiels, .	London, .	120–122	122–124	127–129	130–133
		Liverpool, .	114–120/6	114–125	120–132	124–132
		Bristol, .	—	—	—	—
		Cardiff, .	116–124	126–127	120–131	135–136
		Manchester, .	118–122	122–127/6	122–132	129–135/6
		Birmingham,	119–121	124–126	127–129	131–132
		Newcastle-on Tyne,	118–123	122–126	125–130	128–135
		Glasgow, .	117–118	120–121	123–126	129–130
		Leith, .	119	122/6	125	129
		Hull, . .	114–122	122–124	121–123	125–127
	1lb. rolls, 10×24 lb. boxes.	F.O.R. London	—	—	—	—
Finland .	Kiels, .	Manchester, .	115–118	117–121/6	118–127	126/6–130/6
		Liverpool, .	110–116	112–116	117–119/6	122–124
		Hull, . .	106–107	110–112	112–114	117–119
		Cardiff, .	—	—	—	—

ENDED 30TH SEPTEMBER, 1914.

"GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED								
AUGUST.					SEPTEMBER.			
1st.	8th.	15th.	22nd.	29th.	5th.	12th.	19th.	26th.
Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
118-122	135-144	138-149	120-130	118-130	114-126	114-124	112-122	116-124
118-122	120-160	130-145	118-225	118-123	116-122	116-120	116-125	120-130
120-126	—	140-150	126-130	120-130	120-128	120-126	120-126	122-132
120-124	135-140	135-150	125-135	122-127	122-128	122-126	118-124	124-128
121-126	129-134	145	—	122-124	120-122	120-122	—	118-128
121-123	—	—	124-130	123-125	122-124	120-123	120-123	123-126
123-124	140-150	130-140	122-126	118-122	118-122	118-120	118-120	122-123
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
119/-121/4	144/8-149/4	—	121/4-130/8	121/4	121/4	121/4	117-121/6	120-122
130/8	135/4	135/4	130/8-135/4	130/8-135/4	130/8	126-130/8	126-130/8	133-135/4
98-112	120-130	125-140	108-116	104-114	104-114	102-114	98-114	102-114
100-108	130	125-130	106-112	108-112	108-110	106-110	104-110	106-112
98-110	—	120-130	—	—	108-116	102-112	102-112	102-112
106-108	125	120-128	114-118	108-112	112-114	110-114	108-114	106-112
—	—	—	—	—	—	—	—	—
96-102	108-129	106-114	98-104	101-102	102-103	102-103	102-103	103-108
95-101	107-128	102-113	94-97	96-97	94-97	89-94	95-97	98-100
—	—	—	—	—	—	—	—	90
103-111	115-129	108-120	96-104	96-100	96-100	96-97	97-100	100-102
Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
10/6-13/6	—	13/6-16/6	12/6-15/6	11/6-15/6	11/6-14/6	11/--14/6	10/6-13/6	10/6-13/6
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
108-118	—	136	126-135	120-135	116-125	110-125	106-117	106-117
111 Kr. per 50 Kilos = 124/0 per cwt.	— Kr per — Kilos — per cwt.	— Kr. per — Kilos — per cwt.	101 Kr. per 50 Kilos — 112/4 per cwt.	101 Kr. per 50 Kilos — 112/4 per cwt.	101 Kr. per 50 Kilos — 112/4 per cwt.	102 Kr. per 50 Kilos = 113/3 per cwt.	106 Kr. per 50 Kilos — 117/7 per cwt.	112 Kr. per 50 Kilos = 124/2 per cwt.
—	—	—	—	—	—	—	—	—
131-134	140-150	135-146	126-134	126-132	124-130	124-128	124-130	134-138
127-136	120-160	145-155	125-135	121-130	120-128	120-128	124-132	128-140
—	—	—	—	—	—	—	—	—
139	—	145	140-142	138-140	135-136	132-133	134	138
131-137	136-145	150-155	125-135	126-132	124-128	124-127	—	126-133
135-136	—	—	130-140	130-132	126-130	126-130	127-130	129-133
132-135	133-180	130-170	134-144	120-130	120-127	122-127	124-133	127-137
133-134	—	—	130	124-127	124-127	124-127	125-127	129-131
133/6	138-140	—	135	122-124	124	124	125/6	131-133
130-135	150-160	140-150	138-145	128-134	133-136	126-128	126-128	128-136
—	—	—	—	—	—	—	—	—
128-131	134-137	150-155	—	124-125	122-123	122-123	—	124-126
124-127	—	—	—	—	—	—	—	—
123-128	140-145	135-140	130-136	128-133	127-130	121-123	121-123	124-126
—	—	—	—	—	—	—	—	—

[Continued on pages 216 and 217.

BUTTER PRICES DURING THE QUARTER

Abstracted from "The Grocer," "Grocer's Review,"

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the
an Irish Creamery would be 5*s.* to 7*s.* per cwt. less than
freight, commission,

Country of Origin.	Type of Package.	Place of Sale.	Week Ended. July			
			4th.	11th.	18th.	25th.
			Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
Russia and Siberia,	Kiels,	London,	100–104	102–104	104–106	106–108
		Liverpool,	98–104	100–106	100–107	102–110
		Bristol,	100–106	102–110	104–110	106–112
		Cardiff,	98–107	98–107	103–110	108–110
		Manchester,	98–107	100–106	100–107	104–111
		Birmingham,	103–104	104–106	104–108	104–110
		Glasgow,	102–104	104–106	106–108	108–110
		Leith,	97–102	100–105	100–105	104–107
		Hull,	—	—	—	—
Holland,	Boxes,	London,	108	110	114–116	118
	Rolls,	do.,	12/6–13	12/6–13	13–13/6	13/6–14
	Boxes,	Glasgow,— Fresh,	—	—	—	—
		Salt,	—	—	—	—
		Manchester,	—	—	—	—
		Hull,	110–112	111–113	114–117	119–120
			Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
Italy,	Rolls,	London,	—	—	—	—
			Per cwt.	Per cwt.	Per cwt.	Per cwt.
Canada,	56 lb. Boxes,	London,	—	—	—	—
		Liverpool,	—	—	—	—
		Bristol,	—	—	—	—
		Cardiff,	—	—	—	—
		Bermingham,	—	—	—	—
		Manchester,	—	—	—	—
		Glasgow,	—	—	—	—
Australia and New Zealand, *	Boxes,	London,	A.s.100–106 u.104–110 Z. 112–118	A.s.106–108 u. 108–110 Z. 114–120	A.s.106–112 u. 110–114 Z. 116–120	A s.108–114 u. 112–116 Z. 118–122
		Liverpool,	A. — Z. —	A. — Z. —	A. — Z. —	A. — Z. —
		Bristol,	A. 104–116 Z. 116–122	A. 104–116 Z. 120–122	A. — Z. —	A. 108–118 Z. 122–124
		Cardiff,	A. — Z. —	A. — Z. —	A. — Z. —	A. — Z. —
		Manchester,	A. — Z. —	A. — Z. —	A. — Z. —	A. — Z. —
		Birmingham,	A. — Z. —	A. — Z. —	A. — Z. —	A — Z. —
		Glasgow,	A. — Z. —	A. — Z. —	A. — Z. —	A. — Z. —
		Leith,	A. — Z. —	A. — Z. —	A. — Z. —	A. — Z. —
		Hull,	A. — Z. —	A. — Z. —	A. — Z. —	A. — Z. —
Argentina,	Boxes,	London,	—	—	—	—
		Liverpool,	—	—	—	—
		Bristol,	—	—	—	—
		Cardiff,	—	—	—	—
		Manchester,	—	—	—	—
		Birmingham,	—	—	—	—
		Glasgow,	—	—	—	—
United States,	Tubs and boxes,	London,	—	—	—	—
		Liverpool,	—	—	—	—
		Bristol,	—	—	—	—
		Cardiff,	—	—	—	—
		Manchester,	—	—	—	—

* A.—Australia. Z.—New Zealand. s.—salted. u.—unsalted.

ENDED 30TH SEPTEMBER, 1914—*Continued.*

"GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED.								
AUGUST					SEPTEMBER			
1st.	8th.	15th.	22nd.	29th.	5th.	12th.	19th.	26th.
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.
110-114	130-140	130-140	116-126	118-122	116-120	116-120	114-118	116-120
105-112	120-160	140-145	120-125	125-130	—	—	—	118-128
108-116	—	140	125-130	118-128	118-128	118-128	118-126	115-126
108-114	—	130-140	123-130	122	121-124	118-120	—	118-122
103-114	120-126	138-140	—	118-120	—	—	—	—
106-110	—	—	120-130	120-122	—	—	—	—
110-112	—	—	—	—	—	—	—	—
103-110	126-130	—	—	—	—	—	—	—
—	—	130-135	—	—	—	—	—	—
118	—	—	114-124	114-120	114-120	114-120	112-120	116-124
13/6-14	—	—	14-14/6	14-14/6	14-14/6	14-14/6	14-14/6	14-14/6
—	—	—	—	—	—	—	—	128-130
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
119-126	140-145	140-145	134-136	126-133	126-130	126-128	122-126	126-128
Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
—	—	—	—	—	—	—	—	—
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	124-130	124-130	124-130
—	—	—	—	—	—	121-125	—	124-128
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
A.s.112-114	A.s.130-140	A.s.130-140	A.s.120-130	A.s.118-124	A.s.118-122	A.s.118-120	A.s.116-120	A.s.118-122
u.114-116	u. 130-140	u. 130-140	u.120-130	u.120-126	u.120-124	u.118-120	u.118-120	u.120-124
Z. 120-124	Z. —	Z. —	Z. —	Z. —	Z. 124-130	Z. —	Z. —	Z. —
A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —
Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —
A. 110-118	A. —	A. 135-140	A. —	A. 116-124	A. 116-124	A. 116-124	A. 116-124	A. 116-124
Z. 124	Z. —	Z. 146-150	Z. —	Z. 136-140	Z. 136-140	Z. 136-140	Z. 134-138	Z. 134-138
A. —	A. 132-135	A. —	A. 130	A. 126	A. —	A. —	A. —	A. —
Z. —	Z. —	Z. —	Z. —	Z. 130	Z. —	Z. —	Z. —	Z. —
A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —
Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —
A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —
Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —
A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —
Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —
A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —
Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —
A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. 120-125
Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. 120-125
—	—	—	—	—	—	—	116-118	116-120
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—

TABLES SHOWING THE EXPORTS

TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT the PORTS OF EMBARKATION

IRISH PORTS.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina, .	254	10	—	—	331	—	595	—	—	10,452	10,452
Belfast,	12,999	24,561	1,271	2,776	143	118	41,868	2,709	—	9,544	12,253
Coleraine	2	347	—	4	—	—	353	—	66	—	66
Cork, .	12,514	17,434	349	620	181	1,349	32,447	2,043	3,551	22,196	27,790
Drogheda, .	7,381	380	186	12	—	—	7,959	4,690	62	8,693	13,445
Dublin, .	67,964	27,236	5,039	477	53	3,030	103,799	52,727	—	63,882	116,609
Dundalk, .	9,555	4,945	424	512	—	—	15,436	12,530	428	24,883	37,841
Greenore, .	7	1,436	138	296	—	—	1,877	180	—	—	180
Larne, .	66	5,987	4	204	—	12	6,273	38	360	459	857
Limerick, .	610	41	—	—	165	21	837	105	—	—	105
Londonderry,	3,773	13,595	313	581	4	1,805	20,071	4,771	3,114	6,922	14,807
Milford, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Newry, .	517	1,368	42	59	—	—	1,986	2,103	617	7,756	10,476
Portrush, .	—	—	—	—	—	—	—	—	—	—	—
Sligo, .	975	229	—	1	—	—	1,205	173	60	4,193	4,426
Waterford, .	23,577	10,380	66	134	17	847	35,021	11,909	—	14,652	26,561
Westport, .	223	—	1	1	77	—	302	2,599	—	6,249	8,848
Wexford, .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	140,417	107,949	7,833	5,677	971	7,182	270,029	96,577	8,258	179,881	284,716

TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT the PORTS OF DEBARKATION

BRITISH PORTS.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total	Fat.	Stores.	Lambs.	Total.
Ardrossan, .	—	—	—	—	—	—	—	—	—	—	—
Ayr, .	1,284	14,412	32	511	—	86	16,325	3	358	74	435
Barrow, .	132	1,410	46	292	—	22	1,902	—	—	—	—
Bristol, .	3,156	8,885	76	58	—	396	12,571	4,349	1,556	4,108	10,013
Cardiff, .	128	511	1	13	—	4	657	27	118	1,235	1,380
Dover .	—	—	—	—	—	—	—	—	—	—	—
Falmouth, .	—	—	—	—	—	—	—	—	—	—	—
Fishguard, .	7,010	13,886	239	476	—	1,305	22,916	5,123	1,877	10,719	17,719
Fleetwood, .	620	992	709	480	23	—	2,824	1,657	—	5,288	6,945
Glasgow, .	22,313	21,388	1,332	1,486	776	2,212	49,507	3,241	66	7,747	11,054
Greenock, .	2,337	7,136	162	189	—	185	10,009	61	—	46	107
Heysham, .	4,242	10,056	1,611	573	—	403	16,885	3,205	3,114	2,179	8,498
Holyhead, .	8,923	8,284	1,171	491	—	966	19,835	8,547	—	13,228	21,775
Liverpool, .	80,745	14,328	2,373	909	172	1,569	100,096	62,896	1,167	126,116	190,179
London, .	—	—	—	—	—	—	—	—	—	—	—
Manchester, .	7,626	29	65	24	—	—	7,744	7,413	—	8,726	16,139
Newhaven, .	—	—	—	—	—	—	—	—	—	—	—
Plymouth, .	151	—	—	—	—	—	151	—	—	—	—
Preston, .	—	—	—	—	—	—	—	—	—	—	—
Silloth, .	1,704	1,883	14	—	—	32	3,633	17	—	—	17
Southampton,	—	—	—	—	—	—	—	—	—	—	—
Stranraer, .	46	4,749	2	175	—	2	4,974	38	2	415	455
Whitehaven,	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	140,417	107,949	7,833	5,677	971	7,182	270,029	96,577	8,258	179,881	284,716

AND IMPORTS OF ANIMALS.

I.

BRITAIN during the Three Months ended 30TH SEPTEMBER, 1914, showing IN IRELAND.

Swine. Fat.	Swine. Stores.	Swine. Total.	Goats.	Horses. Stallions.	Horses. Mares.	Horses. Geldings.	Horses. Total.	Mules or Jennets	Asses	Total Animals	IRISH PORTS.
321	—	321	2	—	—	—	—	—	—	11,370	Ballina.
818	243	1,061	2	2	892	1,610	2,504	—	16	57,704	Belfast.
11	—	11	—	—	2	4	6	—	—	436	Coleraine.
1,186	—	1,186	—	4	260	323	587	1	132	62,143	Cork.
286	30	316	2	—	10	14	24	—	—	21,746	Drogheda.
4,190	—	4,190	4	39	1,324	1,038	2,401	2	108	227,113	Dublin.
2,116	46	2,162	7	—	425	443	868	—	55	56,369	Dundalk.
22	—	22	—	—	900	667	1,567	—	53	3,699	Greenore.
45	224	269	—	2	63	146	211	—	—	7,610	Larne.
—	—	—	—	—	—	1	1	—	—	943	Limerick.
275	—	275	1	—	68	92	160	1	3	35,318	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Milford.
—	—	—	—	—	—	—	—	—	—	—	Mulroy.
102	—	102	5	—	—	1	1	—	53	12,623	Newry.
—	—	—	—	—	—	—	—	—	—	—	Portrush.
2,853	—	2,853	—	—	—	—	—	—	—	8,484	Sligo.
2,035	—	2,035	1	2	345	510	857	2	132	64,609	Waterford.
43	—	43	—	—	3	1	4	—	—	9,197	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
14,303	543	14,846	24	49	4,292	4,850	9,191	6	552	579,364	TOTAL.

II.

BRITAIN during the Three Months ended 30TH SEPTEMBER, 1914, showing IN GREAT BRITAIN.

Swine. Fat.	Swine. Stores.	Swine. Total.	Goats.	Horses. Stallions	Horses. Mares.	Horses. Geldings.	Horses. Total.	Mules or Jennets	Asses.	Total Animals	BRITISH PORTS.
—	—	—	—	—	250	439	689	—	55	744	Ardrossan.
91	239	330	—	1	74	123	198	—	—	17,288	Ayr.
187	—	187	—	—	25	59	84	—	—	2,173	Barrow.
39	—	39	—	—	58	60	118	—	33	22,774	Bristol.
—	—	—	—	—	—	—	—	—	—	2,037	Cardiff.
—	—	—	—	—	—	—	—	—	—	—	Dover
—	—	—	—	—	—	—	—	—	—	—	Falmouth
1,239	—	1,239	—	2	459	642	1,103	2	164	43,143	Fishguard.
—	—	—	—	1	276	461	738	—	7	10,514	Fleetwood
2,327	—	2,327	2	1	317	492	810	—	7	63,707	Glasgow.
30	4	34	1	—	15	17	32	—	1	10,184	Greenock.
42	—	42	—	—	275	324	599	2	2	26,028	Heysham.
3,093	—	3,093	4	37	1,693	1,258	2,988	—	55	47,750	Holyhead.
7,227	76	7,303	17	5	723	750	1,178	1	197	299,271	Liverpool.
—	—	—	—	—	—	1	1	—	—	1	London.
16	—	16	—	—	20	19	39	—	29	23,067	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	—	—	—	—	14	22	36	—	—	187	Plymouth.
—	—	—	—	—	14	9	23	1	—	24	Preston.
—	—	—	—	—	4	5	9	—	2	3,661	Silloth.
—	—	—	—	—	12	23	35	—	—	35	Southampton.
12	224	236	—	2	63	146	211	—	—	5,876	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Whitehaven.
14,303	543	14,846	24	49	4,292	4,850	9,191	6	552	579,364	TOTAL.

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT
the PORTS OF

IRISH PORTS.	CATTLE.							SHEEP.			
	Fat	Stores (fattening)	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina, .	—	—	—	—	—	—	—	—	—	—	—
Belfast, .	—	20	—	—	5	—	25	—	2,481	5	2,486
Coleraine, .	—	—	—	—	—	—	—	—	—	—	—
Cork, .	—	4	1	2	2	—	9	—	2	—	2
Drogheda, .	—	—	—	—	—	—	—	—	—	—	—
Dublin, .	—	6	12	—	—	1	19	—	370	254	624
Dundalk, .	—	—	—	—	—	—	—	—	—	—	—
Greenore, .	—	—	—	—	—	—	—	—	—	—	—
Larne, .	—	—	—	—	—	—	—	—	684	170	854
Limerick, .	—	—	—	—	—	—	—	—	—	—	—
Londonderry,	—	2	—	—	—	—	2	—	317	179	496
Milford, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Newry, .	—	—	—	—	—	—	—	—	—	—	—
Portrush, .	—	—	—	—	—	—	—	—	—	—	—
Sligo, .	—	—	—	—	—	—	—	—	3	—	3
Waterford, .	—	1	—	—	—	—	1	—	49	—	49
Westport, .	—	—	—	—	—	—	—	—	—	—	—
Wexford, .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	—	33	13	2	7	1	56	—	3,906	608	4,514

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT
the PORTS of EMBARKATION

BRITISH PORTS.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ardrossan, .	—	—	—	—	—	—	—	—	2	—	2
Ayr, .	—	—	—	—	—	—	—	—	2,845	—	2,845
Barrow, .	—	—	—	—	—	—	—	—	—	—	—
Bristol, .	—	2	—	—	—	—	2	—	—	—	—
Cardiff, .	—	—	—	—	—	—	—	—	—	—	—
Falmouth, .	—	—	—	—	—	—	—	—	—	—	—
Fishguard, .	—	1	1	—	—	—	2	—	2	—	2
Fleetwood, .	—	—	—	—	—	—	—	—	—	—	—
Glasgow, .	—	23	4	—	—	—	27	—	644	218	862
Greenock, .	—	—	—	—	—	—	—	—	50	179	229
Heysham, .	—	1	—	—	—	—	1	—	1	5	6
Holyhead, .	—	5	8	—	—	1	14	—	2	—	2
Liverpool, .	—	1	—	—	—	—	1	—	2	—	2
London, .	—	—	—	—	—	—	—	—	—	—	—
Manchester, .	—	—	—	—	—	—	—	—	—	—	—
Newhaven, .	—	—	—	—	—	—	—	—	—	—	—
Plymouth, .	—	—	—	2	2	—	4	—	—	—	—
Preston, .	—	—	—	—	—	—	—	—	—	—	—
Silloth,	—	—	—	—	—	—	—	—	40	36	76
Southampton,	—	—	—	—	5	—	5	—	—	—	—
Stranraer, .	—	—	—	—	—	—	—	—	318	170	488
Whitehaven, .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	—	33	13	2	7	1	56	—	3,906	608	4,514

III.

BRITAIN during the Three Months ended 30TH SEPTEMBER, 1914, showing DEBARKATION IN IRELAND.

Swine.			Goats.	Horses.				Mules or Jennets	Asses.	Total Animals	Irish Ports.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	—	—	—	—	—	—	Ballina.
—	—	—	—	4	183	123	310	—	—	2,821	Belfast.
—	—	—	—	—	—	1	1	—	—	1	Coleraine.
—	—	—	—	17	36	11	61	—	—	75	Cork.
—	—	—	1	—	1	1	2	—	—	2	Drogheda.
—	4	4	—	131	347	94	572	—	2	1,222	Dublin.
—	—	—	—	—	—	2	2	—	—	2	Dundalk.
—	—	—	—	—	33	38	71	—	—	71	Greenore.
—	—	—	—	1	14	10	25	—	—	879	Larne.
—	—	—	—	—	—	—	—	—	—	—	Limerick.
—	—	—	1	7	11	14	32	—	—	531	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Milford.
—	—	—	—	—	—	—	—	—	—	—	Mulroy.
—	—	—	—	—	1	1	2	—	—	2	Newry.
—	—	—	—	—	—	—	—	—	—	—	Portrush.
—	—	—	—	—	—	1	1	—	—	4	Sligo.
—	—	—	—	8	15	28	51	—	—	101	Waterford.
—	—	—	—	—	—	—	—	—	—	—	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
—	4	4	2	168	641	324	1,133	—	2	5,711	TOTAL.

IV.

BRITAIN during the Three Months ended 30TH SEPTEMBER, 1914, showing IN GREAT BRITAIN.

Swine.			Goats.	Horses.				Mules or Jennets	Asses.	Total Animals	British Ports.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	21	29	50	—	—	52	Ardrossan.
—	—	—	—	1	140	74	215	—	—	3,060	Ayr.
—	—	—	—	—	—	—	—	—	—	—	Barrow.
—	—	—	—	—	—	1	1	—	—	3	Bristol.
—	—	—	—	—	—	—	—	—	—	—	Cardiff.
—	—	—	—	—	—	—	—	—	—	—	Falmouth.
—	—	—	—	8	15	29	52	—	—	56	Fishguard.
—	—	—	—	2	8	11	21	—	—	21	Fleetwood.
—	—	—	—	2	10	10	22	—	—	911	Glasgow.
—	—	—	—	7	9	13	29	—	—	258	Greenock.
—	—	—	1	—	7	5	12	—	—	20	Heysham.
—	—	—	1	81	278	101	460	—	2	479	Holyhead.
—	4	4	—	3	14	14	31	—	—	38	Liverpool.
—	—	—	—	—	—	1	1	—	—	1	London.
—	—	—	—	—	—	1	1	—	—	1	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	—	—	—	15	31	3	49	—	—	53	Plymouth.
—	—	—	—	—	—	—	—	—	—	—	Preston.
—	—	—	—	48	93	20	161	—	—	237	Silloth.
—	—	—	—	—	1	2	3	—	—	8	Southampton.
—	—	—	—	1	14	10	25	—	—	513	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Whitehaven
—	4	4	2	168	641	324	1,133	—	2	5,711	TOTAL.

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the
showing the PORTS of

Irish Ports.	Cattle.					Sheep.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
Belfast, .	—	125	—	1	126	50	60	110
Dublin, .	166	93	—	76	335	176	925	1,101
Total, .	166	218	—	77	461	226	985	1,211

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the
showing the PORTS of DEBARKATION

Isle of Man Port.	Cattle.					Sheep.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
Douglas, .	166	218	—	77	461	226	985	1,211

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the
showing the PORTS of

Irish Ports.	Cattle.					Sheep.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
Belfast, .	—	—	—	—	—	—	—	—
Dublin, .	—	—	—	—	—	—	—	—
Total, .	—	—	—	—	—	—	—	—

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the
showing the PORTS of EMBARKATION

Isle of Man Port.	Cattle					Sheep.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
Douglas, .	—	—	—	—	—	—	—	—

Isle of Man during the Three Months ended 30th September, 1914, Embarkation in Ireland.

Swine. Fat.	Swine. Stores.	Swine. Total.	Goats	Horses. Stallions	Horses. Mares.	Horses. Geldings	Horses. Total.	Mules or Jennets.	Asses.	Total Animals.	Irish Ports.
—	2	2	—	—	18	29	47	—	—	285	Belfast.
—	—	—	—	—	1	—	1	—	—	1,437	Dublin.
—	2	2	—	—	19	29	48	—	—	1,722	Total

Isle of Man during the Three Months ended 30th September, 1914, in the Isle of Man.

Swine. Fat.	Swine. Stores.	Swine. Total.	Goats.	Horses. Stallions	Horses. Mares.	Horses. Geldings	Horses. Total.	Mules or Jennets.	Asses.	Total Animals.	Isle of Man Port.
—	2	2	—	—	19	29	48	—	—	1,722	Douglas.

Isle of Man during the Three Months ended 30th September, 1914, Debarkation in Ireland.

Swine. Fat.	Swine. Stores.	Swine. Total.	Goats.	Horses. Stallions	Horses. Mares.	Horses. Geldings	Horses. Total.	Mules or Jennets.	Asses.	Total Animals.	Irish Ports.
—	—	—	—	—	2	3	5	—	—	5	Belfast.
—	—	—	—	—	—	—	—	—	—	—	Dublin.
—	—	—	—	—	2	3	5	—	—	5	Total.

Isle of Man during the Three Months ended 30th September, 1914, in the Isle of Man.

Swine. Fat.	Swine. Stores.	Swine. Total.	Goats.	Horses. Stallions	Horses. Mares.	Horses. Geldings	Horses. Total.	Mules or Jennets.	Asses.	Total Animals.	Isle of Man Port.
—	—	—	—	—	2	3	5	—	—	5	Douglas.

RETURN OF THE NUMBER OF ANIMALS SHIPPED to and from Places in the Places of Embarkation

Irish Ports.	Cattle.					Sheep.			Swine.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs	Total.	Fat.	Stores.	Total.
Cork to Aghada Pier, .	—	—	—	—	—	—	—	—	—	—	—
„ to Belfast, .	—	3	—	—	3	—	—	—	—	—	—
„ to Spike Island, .	—	—	—	—	—	—	—	—	—	—	—
„ to Queenstown, .	—	—	—	—	—	—	—	—	—	—	—
„ to Waterford, .	—	21	—	3	24	—	—	—	—	—	—
Total, . .	—	24	—	3	27	—	—	—	—	—	—
Aghada Pier to Cork, .	—	—	—	—	—	—	—	—	—	—	—
Belfast „ .	—	—	—	—	—	—	—	—	—	—	—
Spike Island „ .	—	—	—	—	—	—	—	—	—	—	—
Queenstown „ .	—	—	—	—	—	—	—	—	—	—	—
Waterford „ .	—	1	—	1	2	—	5	5	—	—	—
Total, . .	—	1	—	1	2	—	5	5	—	—	—
Waterford to Ballyhack,	—	4	—	—	4	—	6	6	—	6	6
„ to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
„ to Duncannon	—	24	—	4	28	—	—	—	1	10	11
Total, . .	—	28	—	4	32	—	6	6	1	16	17
Ballyhack to Waterford,	27	—	—	—	27	—	—	—	—	—	—
Dublin to Belfast, .	310	84	—	—	394	264	465	729	—	—	—
Duncannon to Waterford,	192	14	—	—	206	266	20	286	216	—	216
Kilrush to Limerick, .	—	110	—	—	110	—	—	—	256	—	256
Kildysart „ .	—	—	—	—	—	—	—	—	—	—	—
Glin, „ .	—	—	—	—	—	—	—	—	—	—	—
Portumna, „ .	—	—	—	—	—	—	—	—	—	—	—
Tarbert, „ .	—	—	—	—	—	—	—	—	20	—	20
Kilkee, „ .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	—	110	—	—	110	—	—	—	276	—	276
Milford to Portrush,	—	—	—	—	—	—	—	—	—	—	—
Belfast to Dublin, .	—	—	—	15	15	—	—	—	—	—	—
Londonderry to Moville,	—	—	—	—	—	—	—	—	—	—	—
Moville to Londonderry,	—	60	—	—	60	59	—	59	—	—	—
Ballina to Sligo, . .	—	—	—	—	—	—	—	—	—	—	—
Belmullet „ . .	1	—	—	—	1	21	222	243	778	—	778
Westport „ . .	—	—	—	—	—	—	—	—	—	—	—
Total, .	1	—	—	—	1	21	222	243	778	—	778
Sligo to Belmullet, .	—	—	—	—	—	—	—	—	—	1	1
Milford to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy to Milford, .	—	—	—	—	—	—	—	—	—	—	—
Dublin to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Leitbeg to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	530	321	—	23	874	610	718	1,328	1,271	17	1,288

INLAND NAVIGATION.

Ireland during the Three Months ended 30TH SEPTEMBER, 1914, showing and Debarkation.

Goats.	Horses.				Mules or Jennets.	Asses.	Total Animals.	IRISH PORTS.
	Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	—	—	—	Cork to Aghada Pier.
—	—	—	—	—	—	—	3	„ to Belfast.
—	—	—	—	—	—	—	—	„ to Spike Island.
—	—	—	—	—	—	—	—	„ to Queenstown.
—	—	—	—	—	—	—	24	„ to Waterford.
—	—	—	—	—	—	—	27	Total.
—	—	—	—	—	—	—	—	Aghada Pier to Cork.
—	—	—	—	—	—	—	—	Belfast „
—	—	—	—	—	—	—	—	Spike Island „
—	—	—	—	—	—	—	—	Queenstown „
—	—	—	—	—	—	—	7	Waterford „
—	—	—	—	—	—	—	7	Total.
—	—	—	—	—	—	—	16	Waterford to Ballyhack.
—	—	—	—	—	—	—	—	„ to Belfast.
—	—	—	—	—	—	—	39	„ to Duncannon.
—	—	—	—	—	—	—	55	Total.
—	—	—	—	—	—	—	27	Ballyhack to Waterford.
—	—	—	—	—	—	—	1,123	Dublin to Belfast.
—	—	—	—	—	—	—	708	Duncannon to Waterford.
—	—	—	—	—	—	—	366	Kilrush to Limerick.
—	—	—	—	—	—	—	—	Kildysart „
—	—	—	—	—	—	—	—	Glin „
—	—	—	—	—	—	—	—	Portumna „
—	—	—	—	—	—	—	20	Tarbert „
—	—	—	—	—	—	—	—	Kilkee „
—	—	—	—	—	—	—	386	Total.
—	—	—	—	—	—	—	—	Milford to Portrush.
—	—	2	—	2	—	—	17	Belfast to Dublin.
—	—	—	—	—	—	—	—	Londonderry to Moville.
—	—	1	—	1	—	—	120	Moville to Londonderry.
—	—	—	—	—	—	—	—	Ballina to Sligo.
—	—	—	—	—	—	—	1,022	Belmullet „
—	—	—	—	—	—	—	—	Westport „
—	—	—	—	—	—	—	1,022	Total.
—	—	—	—	—	—	—	1	Sligo to Belmullet.
—	—	—	—	—	—	—	—	Milford to Mulroy.
—	—	—	—	—	—	—	—	Mulroy to Milford.
—	—	—	—	—	—	1	1	Dublin to Waterfor
—	—	—	—	—	—	—	—	Leitbeg to Mulroy.
—	—	3	—	3	—	1	3,494	Total

RETURN of the NUMBER of HORSES EXPORTED from IRELAND through GREAT BRITAIN to the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 30TH SEPTEMBER, 1914, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast,	—	80	77	157
Cork,	—	—	—	—
Dublin,	1	56	68	125
Dundalk,	—	78	52	130
Greenore,	—	494	308	802
Waterford,	—	34	91	125
Wexford,	—	—	—	—
Total,	1	742	596	1,339

RETURN of the NUMBER of HORSES IMPORTED into IRELAND through GREAT BRITAIN from the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 30TH SEPTEMBER, 1914, showing the Ports of Debarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast,	—	76	49	125
Dublin,	15	27	6	48
Total,	15	103	55	173

RETURN of the NUMBER of HORSES EXPORTED from IRELAND direct to FOREIGN COUNTRIES during the THREE MONTHS ended 30TH SEPTEMBER, 1914, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Cork,	—	—	—	—
Limerick,	—	—	—	—
Total,	—	—	—	—

DISEASES OF ANIMALS IN IRELAND.

NUMBER OF OUTBREAKS of SWINE FEVER, and NUMBER of SWINE returned as having been SLAUGHTERED in Ireland, under the Diseases of Animals Act of 1894, in the undermentioned period, by Order of the Department.

Quarter ended	Swine Fever.	
	Outbreaks confirmed.	Swine Slaughtered as Diseased or as having been Exposed to Infection.
30th September, 1914, . . .	37	187

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been Attacked by ANTHRAX, GLANDERS and FOOT AND MOUTH DISEASE in Ireland in the undermentioned period.

Quarter ended	Anthrax.		Glanders (including Farcy).		Foot and Mouth Disease	
	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.
30th Sept., 1914,	—	—	—	—	1	2

NUMBER of CASES of RABIES in DOGS in IRELAND during the undermentioned period.

Quarter ended	Number of Cases.
30th September, 1914, ...	—

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been attacked by SHEEP-SCAB and PARASITIC-MANGE in Ireland in the undermentioned period.

Quarter ended	Sheep-Scab.		Parasitic-Mange.	
	Outbreaks Reported.	Sheep Attacked.	Outbreaks Reported.	Animals Attacked.
30th Sept., 1914,	57	273	19	30

Veterinary Branch,
Department of Agriculture and Technical Instruction
for Ireland, Dublin.

ACCOUNT showing the QUANTITIES of certain kinds of AGRICULTURAL
into Ireland during each WEEK

ARTICLES	WEEK ENDED				
	4th July	11th July	18th July	25th July	1st August
ANIMALS LIVING—					
Horses, ... No.	—	—	—	—	—
FRESH MEAT—					
Beef (including refrigerated and frozen), ... cwts.	—	—	—	—	—
Mutton, „ „ „ „	—	—	—	—	—
Pork, „ „ „ „	40	—	—	—	—
Unenumerated, „ „ „	—	—	—	—	—
SALTED OR PRESERVED MEAT—					
Bacon, ... cwts.	30	—	42	—	—
Beef, ... „	—	—	—	—	—
Hams, ... „	—	—	—	—	—
Pork, ... „	240	160	166	—	135
Meat, unenumerated, Salted „	—	—	—	—	—
Meat, preserved otherwise than by salting (including tinned and canned), ... cwts.	—	—	2	—	—
DAIRY PRODUCE AND SUBSTITUTES—					
Butter, ... cwts.	—	—	—	—	—
Margarine, ... „	209	235	207	235	186
Cheese, ... „	—	—	1,121	35	428
Milk, Condensed, . . . „	83	89	126	71	78
„ Cream, ... „	—	—	—	—	—
„ Preserved, other kinds „	—	—	—	—	—
EGGS, ... gt. hunds.	—	—	—	180	—
LARD, ... cwts.	6	—	—	—	—
CORN, GRAIN, MEAL AND FLOUR—					
Wheat, ... cwts.	407,300	100,600	—	102,000	177,500
Wheat, Meal and Flour, . „	21,300	300	11,900	24,300	16,800
Barley, ... „	—	—	—	154,700	—
Oats, ... „	—	—	17,700	17,000	20,000
Peas, ... „	—	—	—	—	—
Beans, ... „	—	—	—	—	—
Maize, or Indian Corn, . „	310,700	521,900	267,100	208,100	427,800
FRUIT, RAW—					
Apples, ... „	—	—	—	—	—
Currants, ... „	—	70	18	2	—
Gooseberries, ... „	—	—	—	—	—
Pears, ... „	—	—	—	18	—
Plums, ... „	—	—	—	—	—
Grapes, ... „	—	—	—	—	—
Lemons, ... „	—	—	—	—	—
Oranges, ... „	—	—	—	—	—
Strawberries, ... „	—	—	50	—	—
Unenumerated, ... „	—	—	146	—	—
HAY, ... tons,	—	—	—	—	—
STRAW, ... „	—	—	—	—	—
MOSS LITTER, ... „	44	116	71	38	—
HOPS, ... cwts.	—	—	—	—	—
VEGETABLES, RAW—					
Onions, ... bushels,	—	—	—	—	162
Potatoes, ... cwts.	—	—	—	—	—
Tomatoes, ... „	—	—	—	—	—
Unenumerated, . . . value £	—	—	—	—	—
VEGETABLES, DRIED, . . . cwts.	—	—	—	—	—
Preserved by Canning, . . „	—	—	10	—	—
POULTRY AND GAME, . value £	—	—	—	—	—

*This Table is confined to the Imports of certain kinds of Agricultural Produce into
to a request from this Department kindly consented to separate the Irish Imports (direct)
form of Weekly Returns

Produce imported direct (i.e., from the Colonies or Foreign Countries) of July, August and September, 1914.*

Week Ended							
8th August	15th August	22nd August	29th August	5th Sept.	12th Sept.	19th Sept.	26th Sept.
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
47	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
240	—	—	544	—	—	4	16
—	—	5	—	—	—	80	100
38	46	—	46	16	—	172	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
8	—	—	—	—	—	—	—
86,900	—	45,500	68,000	103,600	29,900	45,900	72,500
24,800	1,900	8,600	12,100	28,200	31,000	—	—
—	—	26,100	—	59,100	—	—	100
—	—	—	8,500	5,700	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
184,100	76,900	993,000	67,700	272,300	202,300	346,700	97,400
—	—	—	—	—	—	114	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	425	—
—	—	—	20	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
5	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
200	—	—	160	—	—	500	300
—	—	—	—	—	—	—	—
—	—	—	62	—	—	—	—
—	—	—	—	—	—	5	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—

Ireland from the Colonies and Foreign Countries. The Board of Customs have in answer from those of the United Kingdom, and to supply this Department with them in the

Statistics and Intelligence Branch,
Department of Agriculture
and Technical Instruction for Ireland.

EMIGRATION FROM IRELAND.

TABLE showing, by Destinations, the Numbers of Emigrants (Natives of Ireland) who left the Ports of Ireland during the Months of July, August and September, 1914, and the total for the Nine Months ended the 30th September, 1914, together with the total Number of Emigrants in each of the corresponding periods of the year, 1913.

DESTINATION.	July, 1914.	August, 1914.	September, 1914.	Nine Months ended 30th September 1914.
FOREIGN COUNTRIES AND THE COLONIES :—				
America (U.S.), .	774	694	1,588	12,681
Canada . . .	231	239	151	2,708
South Africa, . .	10	10	13	110
Australia, . .	86	45	66	635
New Zealand, . .	17	10	28	119
Other Countries, .	2	—	1	20
Total, . . .	1,120	998	1,847	16,273
GREAT BRITAIN :—				
England and Wales, .	81	30	54	679
Scotland, . . .	7	1	10	105
Total, . . .	88	31	64	784
General Total, 1914,	1,208	1,029	1,911	17,057
General Total, 1913,	1,711	1,972	3,854	26,406

The figures in the above Table have been abstracted from the monthly Return published by the Registrar-General for Ireland.

The figures are subject to revision in the Annual Report.

Agricultural Returns of England and Wales, 1914.

PRELIMINARY STATEMENT for 1914, compiled from the Returns collected on the 4th June; and comparison with 1913.

CROPS.

Distribution.	1914.	1913.	Increase.		Decrease.	
	Acres.	*Acres.*	*Acres.*	*Per Cent.*	*Acres.*	*Per Cent.*
Total Area (excluding Water)	37,139,150	37,139,150	—	—	—	—
Total Acreage under all Crops and Grass (a)	27,113,910	27,129,380	..	..	15,470	0·1
Arable Land	10,998,180	11,058,230	..	..	60,050	0·5
Permanent Grass (a) — For Hay ..	4,787,320	5,069,690	..	..	282,370	5·6
Permanent Grass (a) — Not for Hay ..	11,328,410	11,001,460	326,950	3·0	..	..
Permanent Grass (a) — Total ..	16,115,730	16,071,150	44,580	0·3	..	..
Wheat	1,807,410	1,701,590	105,820	6·2	..	..
Barley	1,504,730	1,558,860	..	..	54,130	3·5
Oats	1,929,600	1,974,700	..	..	45,100	2·3
Rye	53,910	51,510	2,400	4·7	..	..
Beans	294,010	268,280	25,730	9·6	..	..
Peas	168,840	164,040	4,800	2·9	..	..
Buckwheat	3,130	3,690	..	..	560	15·2
Potatoes	461,590	442,030	19,560	4·4	..	..
Turnips and Swedes	1,045,090	1,053,390	..	..	8,300	0·8
Mangold	432,350	419,460	12,890	3·1	..	..
Cabbage and Kohl-Rabi	67,980	69,820	..	..	1,840	2·6
Rape	70,470	67,390	3,080	4·6	..	..
Vetches or Tares	123,740	100,940	22,800	22·6	..	..
Lucerne	53,650	57,280	..	..	3,630	6·3
Hops	36,660	35,680	980	2·7	..	..
Small Fruit	77,360	76,860	500	0·7	..	..
Clover and Rotation Grasses — For Hay ..	1,554,960	1,700,480	..	..	145,520	8·6
Clover and Rotation Grasses — Not for Hay ..	826,300	795,350	30,950	3·9	..	..
Clover and Rotation Grasses — Total ..	2,381,260	2,495,830	..	..	114,570	4·6
Other Crops	145,580	128,980	16,600	12·9	..	..
Bare Fallow	340,820	387,900	..	..	47,080	12·1
Orchards (b)	243,110	243,610	..	..	500	0·2

LIVE STOCK.

Distribution.	1914.	1913.	Increase.		Decrease.	
	No.	*No.*	*No.*	*Per Cent.*	*No.*	*Per Cent.*
Horses used for Agricultural purposes (including Mares for Breeding) ..	791,320	807,320	..	..	16,000	2·0
Unbroken Horses (including Stallions) — One year and above	220,570	227,930	..	..	7,360	3·2
Unbroken Horses (including Stallions) — Under one year ..	102,100	105,800	..	..	3,760	3·6
Other Horses	285,550	261,040	24,510	9·4	..	..
Total of Horses ..	1,399,540	1,402,150	..	..	2,610	0·2
Cows and Heifers in Milk or in Calf ..	2,484,180	2,264,400	219,780	9·7	..	..
Other Cattle:—Two years and above	952,290	1,150,620	..	..	198,330	17·2
" One year and under two	1,174,860	1,160,640	14,220	1·2	..	..
" Under one year ..	1,266,420	1,141,280	125,140	11·0	..	..
Total of Cattle ..	5,877,750	5,716,940	160,810	2·8	..	..
Ewes kept for Breeding	6,838,280	6,699,290	138,990	2·1	..	..
Other Sheep:—One year and above ..	3,152,000	3,420,610	..	..	268,610	7·9
" Under one year ..	7,269,850	7,010,390	259,460	3·7	..	..
Total of Sheep ..	17,260,130	17,130,290	129,840	0·8	..	..
Sows kept for Breeding	340,380	280,850	59,530	21·2	..	..
Other Pigs	2,141,030	1,821,250	319,780	17·6	..	..
Total of Pigs ..	2,481,410	2,102,100	379,310	18·0	..	..

(a) Excluding Mountain and Heath Land used for grazing (3,776,150 acres in 1914, as compared with 3,805,270 acres in 1913).

(b) Any Crop or Grass grown in Orchards is also returned under its proper heading.

Agricultural Returns for Scotland, 1914.

Preliminary Statement for 1914, compiled from the Returns collected on the 4th June; and comparison with 1913.

CROPS.

Distribution.	1914.	1913.	Increase.		Decrease.	
	Acres.	*Acres.*	*Acres.*	*Per Cent.*	*Acres.*	*Per Cent.*
Total Area (excluding Water) ..	19,070,193	19,070,193	..	..	..	..
Total Acreage under all Crops and Grass (*a*)	4,786,179	4,797,919	..	..	11,740	0·2
Arable Land	3,295,040	3,301,954	..	..	6,914	0·2
Permanent Grass (*a*) For Hay ..	157,518	157,111	407	0·3	..	..
Permanent Grass (*a*) Not for Hay	1,333,621	1,338,854	..	..	5,233	0·4
Permanent Grass (*a*) Total ..	1,491,139	1,495,965	..	..	4,826	0·3
Wheat	60,518	54,784	5,734	10·5	..	..
Barley (including Bere)	194,110	198,248	..	..	4,138	2·1
Oats	919,578	937,916	..	..	18,338	2·0
Rye	5,360	5,190	170	3·3	..	..
Beans (to be harvested as Corn) ..	6,175	5,968	207	3·5	..	..
Peas	691	713	..	..	22	3·1
Potatoes	152,330	149,080	3,250	2·2	..	..
Turnips and Swedes	430,588	432,139	..	..	1,551	0·4
Mangolds	1,944	1,839	105	5·7	..	..
Cabbage	5,015	5,222	..	..	207	4·0
Rape	8,754	7,758	996	12·8	..	..
Vetches or Tares, for Seed	887	901	..	..	14	1·6
Vetches, Tares, Beans, Mashlum, etc., for Fodder	10,619	10,286	333	3·2	..	..
Lucerne	7	9	..	..	2	22·2
Carrots	446	435	11	2·5	..	..
Onions	183	178	5	2·8	..	..
Flax	6	7	..	..	1	14·3
Small Fruit	7,270	7,135	135	1·9	..	..
Rye-grass and other Rotation Grasses and Clover — For Hay ..	407,856	415,116	..	..	7,260	1·7
Rye-grass and other Rotation Grasses and Clover — Not for Hay ..	1,073,593	1,058,939	14,657	1·4	..	..
Rye-grass and other Rotation Grasses and Clover — Total ..	1,481,449	1,474,052	7,397	0·5	..	..
Other Crops	1,883	1,858	25	1·3	..	..
Bare Fallow	7,227	8,236	..	..	1,009	12·3
Orchards (*b*)	1,465	1,673	..	..	208	12·4

LIVE STOCK.

	No.	*No.*	*No.*	*Per Cent.*	*No.*	*Per Cent.*
Horses used for Agricultural purposes (including Mares for Breeding) ..	135,434	138,018	..	..	2,584	1·9
Unbroken Horses (including Stallions) One year and above	32,996	31,728	1,268	4·0	..	..
Unbroken Horses (including Stallions) Under one year ..	13,683	13,555	128	0·9	..	..
Total	182,113	183,301	..	..	1,188	0·6
Other Horses	27,125	21,140	5,985	28·3	..	..
Total of Horses ..	209,238	204,441	4,797	2·3	..	..
Cows in Milk	363,418	363,448	..	..	30	0·0
Cows in Calf, but not in Milk ..	44,190	67,540	22,501	33·3	..	..
Heifers in Calf	45,851					
Other Cattle :—Two years and above	241,844	273,161	..	..	31,317	11·5
,, One year and under two	271,304	301,451	..	..	30,147	10·0
,, Under one year ..	247,636	241,310	6,326	2·6	..	..
Total of Cattle ..	1,214,243	1,246,910	..	..	32,667	2·6
Ewes kept for Breeding	2,972,926	2,913,998	58,928	2·0	..	..
Other Sheep :—One year and above ..	1,166,433	1,214,457	..	..	48,024	4·0
,, Under one year ..	2,882,598	2,672,671	209,927	7·9	..	..
Total of Sheep ..	7,021,957	6,801,126	220,831	3·2	..	..
Sows kept for Breeding	19,385	14,713	4,672	31·8	..	..
Other Pigs	133,157	117,040	16,117	13·8	..	..
Total of Pigs ..	152,542	131,753	20,789	15·8	..	..

(*a*) Excluding Mountain and Heath Land used for grazing (9,097,064 acres in 1914).
(*b*) Any Crop or Grass grown in Orchards is also returned under its proper heading.

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Vol. XV. **No. 2.**

DEPARTMENT OF AGRICULTURE

AND

TECHNICAL INSTRUCTION FOR IRELAND.

JOURNAL.

Improvement of the Flax Crop by Propagation from Selected Plants—Field Experiments, 1914—The Tuberculin Test as applied to Bovines—First Aid to the Injured and Emergency Nursing—Production and Value of Irish Timber—The Boom in Flax—Manufacture of Synthetic Dyes and the War—Royal College of Science: Engineering Department—Third Irish Egg-Laying Competition—Egg Records for the Year 1913-14—Official Documents—Notes and Memoranda—Statistical Tables.

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No. 2

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1914.

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CONTENTS.

NOTICE.

Communications respecting the literary contents of this JOURNAL *should be addressed to the Superintendent of the Statistics and Intelligence Branch, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin.*

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IMPROVEMENT OF THE FLAX CROP BY PROPAGATION FROM SELECTED PLANTS.

Subjects for Investigation.

In a report on Flax Experiments published in the Department's JOURNAL for April, 1914, some very interesting results are recorded in connection with trials of flax seeds of different origins, also of certain experiments conducted with the object of ascertaining whether the quality of the flax crop is capable of improvement by propagating seed from plants characterised by long stalks. Two very pertinent questions are put forward for decision :—

(1) Can flax seed be successfully saved for sowing purposes in this country ? and

(2) If so, can the flax plant be improved for fibre production by making in successive years a selection of seed from long stalks ?

The report proceeds to state that "the season of 1911 was exceptionally dry, and the green flax was saved in excellent condition. The flax was rippled in November, cleaned and stored immediately afterwards. Good germinating results were obtained from the seed early in 1912, but it apparently did not keep well in storage, for, after the seed was sown, the resulting brairds in 1912 were thin and very delicate, and the general crop was a partial failure."

Further, "A portion of the 1911 crop grown from specially selected Irish seed was not rippled until the following spring, and the seed obtained from this flax retained its vitality, and when sown produced a normal crop."

It is apparent from these statements that the seed saved from the 1911 crop was initially perfectly sound and capable of germinating in a satisfactory manner; also that any deterioration in this respect must have occurred as a result of the conditions to which the seed was subsequently subjected. Loss of germinating capacity on storage is not a feature incidental to flax seed only, but is common to all agricultural seeds. The cause may be traced primarily to lack of "condition," i.e., presence of an excessive amount of moisture in the seed when the crop is harvested, or to the seed absorbing additional water on exposure to the atmosphere, which, in the winter months especially, is heavily charged with moisture.

Conditions necessary for the Germination of Seed.

The three physical conditions necessary for the germination of a seed are (1) the presence of a certain amount of moisture, (2) the presence of an abundant supply of air from which the amount of oxygen necessary for the growth of the new plant may be obtained, and (3) a certain amount of heat. When these three requirements are complied with, the ordinary processes of germination come into operation, and in time the shoots and roots of the plant will appear. The initial changes in a seed brought about by germination are accompanied by the evolution of heat, which may or may not become noticeable, according to the facilities which exist for its dispersion. Thus, if corn is spread out in a thin layer on a loft floor and provision made for the free circulation of air above the grain, the heat that is evolved is immediately circulated amongst a large volume of cooler air. When, however, grain or flax seed, in low "condition," is piled in large heaps on loft floors, the heat evolved in germination is retained. This, very frequently, is augmented by the action of micro-organism, and an active fermentation of the whole mass commences. Under these circumstances the resulting heat alone is sufficient to kill the newly energised germ.

It is possible to conceive conditions under which there is no more than sufficient moisture and heat present to commence germination, but an insufficient volume of air to furnish oxygen, which is absolutely essential for the growing germ, and to carry off the carbon dioxide evolved as a result of the complicated changes the seed is undergoing. The growth of the grain under these conditions is very slow, but proceeds until the depletion of oxygen and the accumulation of carbon dioxide arrests further progress. The seed has by this time lost certain quantities of food materials to no purpose, and when germination recommences, which it may do under more favourable conditions, the young seedling is poorer to this extent. In many cases, however, germination once arrested in this manner never begins again.

Germination will not occur in the absence of any one of the three essential physical conditions. In practice it is impossible to control either the temperature or the supply of air in such a manner as to inhibit germination. If there is, however, an insufficiency of moisture, the normal changes occurring in a seed during storage are not inimical to its future growth. It is unnecessary at present to consider at what point, if any, all changes in the seed are suspended, but it may be taken as a general axiom that the lower the moisture content the less the concomitant changes. The problem of keeping flax seed thus resolves itself into precautionary methods of artificial drying and of subsequent careful storage.

With maltsters and millers in Ireland it is a common practice to dry artificially home-grown barley and wheat, of which there are always certain quantities reserved for seed, on its arrival at the maltings or mill. These two cereals, in all except very dry seasons, contain considerably over 16–18% of moisture, and cannot be stored safely with a moisture content exceeding 12–14%.

With a view to ascertaining whether flax-seed is amenable to similar treatment, the Department conducted a number of drying experiments on a small scale this year.

Effect of Artificial Drying on Germination of Flax Seed.

A sample of Riga flax seed was taken, of which the percentage of germination was ascertained to be 86 and the moisture content 8·3%. A portion of the sample was spread out on butter muslin, on a malt kiln to a uniform depth of about 4 inches. The temperature of the flax seed when placed on the kiln was 65° F., and that of the air of the kiln at the time the drying commenced, 125° F. After three hours drying, at which point the temperature of the seed was 115° F., half the sample was removed, put in a bottle, and, when cool, corked and sealed. The remaining half was allowed to remain on the kiln for a further two hours, at the end of which time its temperature was 125° F., and then removed, likewise placed in a bottle, cooled, corked and sealed. The two dried samples were then tested for germination and moisture content, and the following Table shows the result of these determinations.

TABLE I.

	Moisture	Temperature of Flax Seed on removal from kiln	Germination	Germination after an interval of 5 months.
	%		%	%
Sample 1 (undried) .	8·3	—	86	87
Sample 2 (dried for 3 hours) . .	5·8	115° F.	88	92
Sample 3 (dried for 5 hours) . . .	3·2	125° F.	88	89

It will be seen from these figures that although the moisture content of the seed after five hours drying is 2½ times less than that of the bulk from which the original sample was drawn, the drying has produced no deleterious effect on its germinating capacity.

It has been found that with cereals the immediate effect of artificial drying is to slightly depress the germination, but that such an effect disappears on giving the seed a "rest," or, in other words,

allowing some time to elapse between the drying and subsequent use of the seed.

From the following figures it appears that artificial drying affects flax seed in a similar manner. Two samples drawn from the same bulk of seed were dried for 4 and 8 hours respectively at a temperature commencing at 144° F., reaching 175° F., and then falling to 126° F.

The following table shows the results of germination tests conducted immediately after drying and then at an interval of approximately 4 months.

TABLE II.

	Germination	
	Immediately after drying	After interval of 4 months
	%	%
Sample 1 (after drying 4 hours) . .	15	42
Sample 2 (after drying 8 hours) . .	19	59

Effect of Storing on Germination of Artificially Dried Seed.

In addition to the consideration of the immediate effect of drying it is necessary to ascertain whether the germination of flax seed is or is not impaired during the period which must necessarily elapse between the drying in the autumn and the spring of the succeeding year. In Table I. figures are included which show the results of tests conducted five months after drying, and from these it is evident that the two samples have fully maintained their percentage of germination.

In this connection it would not be out of place to mention that one valuable effect of drying on cereal seeds is to produce a much more even germination and uniform growth during the early stages of the plant's development.

Further experiments on flax seed drying will be conducted with Irish seed grown in 1914. In all probability the percentage of moisture in Irish flax seed is much higher than that found in the Riga sample in Table I., and consequently the rate at which the drying is effected and the point to which it is eventually carried will require to be less than was the case with this sample. It would seem unnecessary, however, to dry below 5 or 6% of moisture, but the trials demonstrate quite clearly that even with 5 hours drying resulting in a reduction of the moisture content to 8·2%, the germination of the flax seed is unimpaired.

Improvement of Flax Crops by Selection of Seed.

Regarding the second question under consideration, namely, the improvement of the flax plant for fibre production, by making in successive years a selection of seed from long stalked plants; it is evident from the manner in which this problem is stated that an improvement in the flax crop is anticipated when all the stalks composing it are long (which is a relative term), but the desirability of producing crops in which all the stalks are long and of the *same length* also appears to be implied.

The whole question of the possibility of improving flax plants by selection (taking for first consideration whatever may be gained by length of stalk) hinges on the degree to which the character of length of stalk is heritable. Most flowering plants may be divided into two classes—those which are self-fertilised and those in which fertilisation is effected by pollen from other plants of the same species. The seeds of cross-fertilised plants usually produce plants exhibiting great variation in their apparent characters; on the other hand, it has been shown that with many self-fertilised plants the amount of variation is extremely small, and the progeny resembles the parent plant very closely.

If flax is self-fertilising, and there is sufficient evidence to show this to be the case, the problem under consideration resolves itself into:—first, the selection, and second, the propagation of seed from those plants exhibiting the maximum degree of length of stalk. The method of selection and manner of propagation, however, deserve most careful consideration. It is impossible to look over a field of flax without noticing the large variation in size occurring in plants growing in close proximity, and the question at once arises as to whether such variations are true indexes of heritable characters, or whether they are the visible effects of temporary variations induced by inequalities in the soil conditions. Thus, seeds from a long-stalked and from a short-stalked plant may be sown within a foot of each other; that from the former may strike a thin piece of soil and grow more or less dwarfed, whilst that from the latter may develop into a vigorous long-stalked plant, owing to its striking highly suitable soil conditions. It is evident that seed from these two plants, when sown separately but under equal soil conditions will produce plants entirely unconformable with the expectations based on the respective characters of the parent plants, for in both cases the true character of "length" of the two original plants was masked by the effects of dissimilar treatment.

Researches into the various questions of flax selection have been carried out by the Department's Plant Breeding Division during the past two or three years. Self-fertilisation is stated to be the

actual method of fertilisation in flax, and the experiments carried out by the Department this year are, as far as they go, entirely confirmatory of this view.

Experiments in the Artificial Fertilisation of Flax.

Two varieties of flax were grown in adjoining seed pans. When the plants came into flower, all the flowers of six plants in one pan were emasculated before fertilisation had taken place. It may be mentioned that in order to do this it was found necessary to remove the stamens before the petals had fully opened. The emasculated flowers were left uncovered until the plant was fully ripe, and under these conditions in no case was any fertilisation found to have been effected by pollen from other plants. The seed boles remained diminutive in size, and on opening them, when the plants were pulled, it was found that none of the seed showed the ordinary growth and development associated with fertilised seed.

Six other plants of the same variety were emasculated, and pollen from the second variety dusted on to the pistil of each flower. The boles of these plants underwent the usual development, and on opening them when the plant was ripe, the enclosed seeds were found to be fully developed.

There is strong evidence in these facts that self-fertilisation is the normal method of fertilisation in the varieties under experiment, and certain proof that the pollen of the one variety was capable of fertilising the other if it could be carried from one plant to another by natural means.

A further series of experiments was conducted to ascertain the permanency of "length of stalk" in plants selected for this character. A number of plants of the same length of stalk was taken and the seed of each rubbed out separately and placed in separate bags. The seeds of the various plants were sown in rows, six inches apart, in the Cereal Cage at Glasnevin, on a piece of soil which had been proved to be even in character by experiments conducted on it in previous years. The seed of each plant was sown by itself and marked off carefully from that of other plants in the same row. To still further equalise the conditions the seeds were sown, by hand, in holes an inch deep and an inch apart, one seed only being placed in each hole, the requisite depth and distance apart of the holes being obtained by the use of a dibbler with teeth one inch apart and one inch deep. During the early stages of growth the vegetative differences of each culture were insufficient to mark off the produce of any one plant from that of the others, but when the plants had reached their maximum growth and commenced to ripen, it was evident that in respect of length of stalk the produce of each plant possessed a standard of its own. But whilst the

IMPROVEMENT OF THE FLAX CROP BY PROPAGATION FROM SELECTED PLANTS.

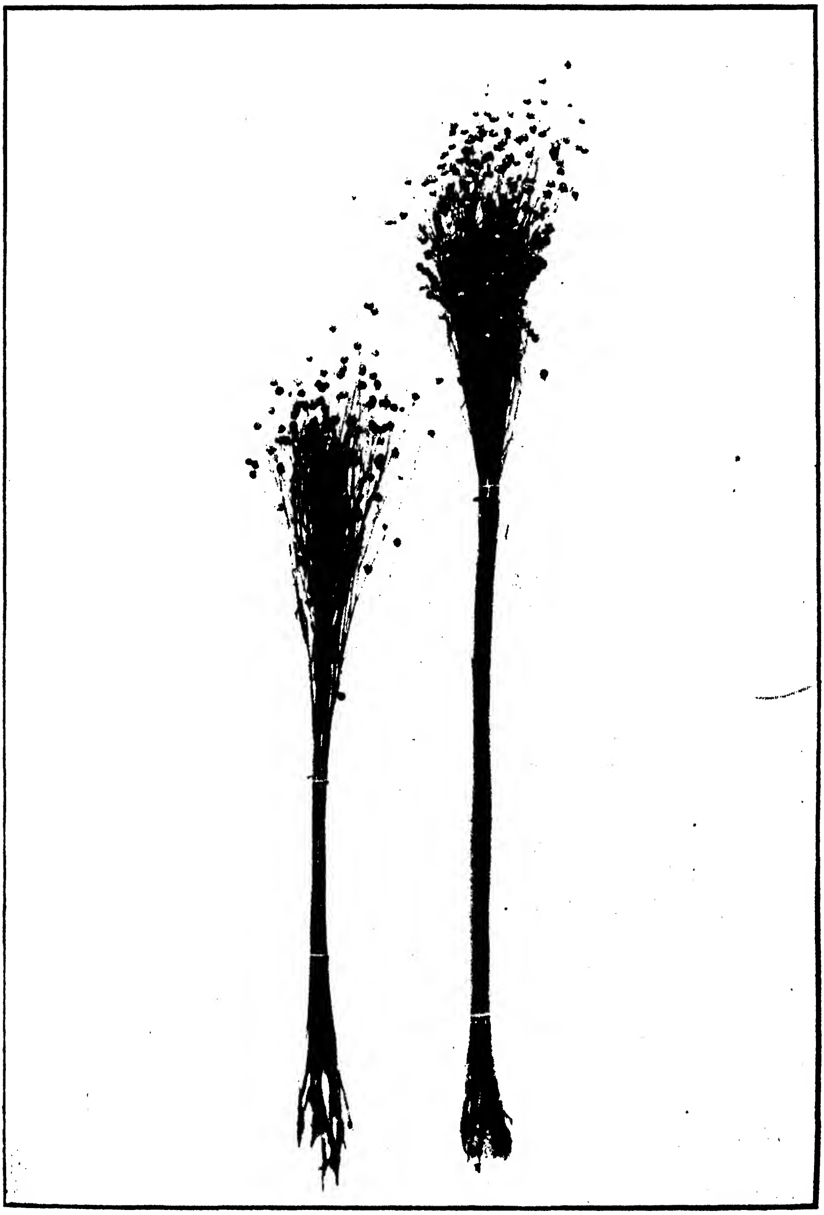


Fig. 1. Showing the produce of two plants selected originally as long-stalked. Only one was a true long-stalked plant.

plants resulting from the seed of an individual plant differed as a whole from those of other individual plants, they showed remarkable uniformity amongst themselves.

The illustration accompanying this article shows the total produce raised in 1914 from the seeds of two plants, each of which was originally selected as being long-stalked. From what has already been said it is evident that the produce of plants selected in this manner and threshed together may possess superior qualities to the crop as a whole from which they were taken, but will be inferior to the selected parent plants unless (which is very unlikely) every plant is a true "length," and not a "length" induced by external influences peculiar to the particular piece of soil or position on which it happened to be grown. There is some evidence to show that plants capable of producing large quantities of seed are not long-stalked but belong to the type characterised by a short stalk and great branching habit. If once this type is introduced into a bulk of seed the proportion in which it occurs is likely to increase from year to year, and thus exert an accumulating deleterious effect on the value of succeeding crops for fibre production.

Several additional observations were made from the single plant cultivations at Glasnevin. It was noted that some cultivations showed a much earlier ripening habit than others, and here again this character was not confined to one plant of a culture, but was uniform in the whole of the produce of the parent plant.

A severe frost was experienced at Glasnevin in common with many other places on the 24th May, 1914, at which time all the flax cultivations were about 3–4 inches high. Several of these remained immune to the effects of this late visitation of cold, but others were conspicuous by the manner in which they suffered. Resistance to cold is not a character likely to prove of extreme importance in this country nor can the incidence of the test be regulated from year to year, but this particular case is worth recording in connection with the general question of the selection of parent stocks.

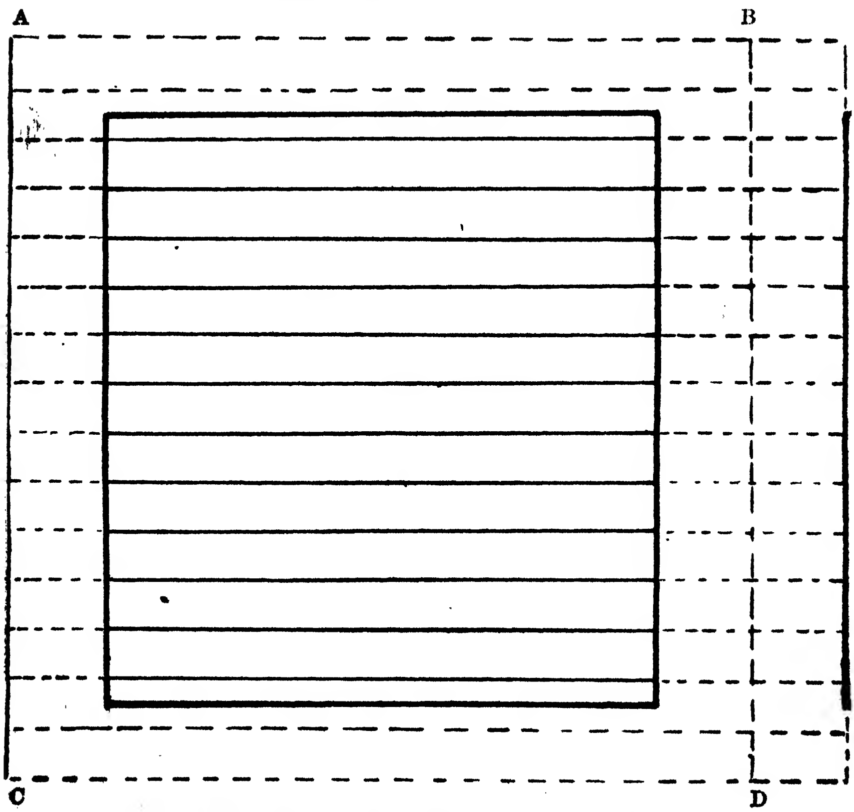
It may be argued that the method of sowing the selected plants in rows 6 inches apart causes exaggerated development in certain directions, and also that the numbers of seeds sown from each parent plant are too small for the purpose of accurate comparisons. To meet such criticisms a modification of a system of small plots already used successfully for the comparison of cereals was adopted. The size of the plots was 16 square feet and they were arranged alternately, as shown in the accompanying diagram—

Flax No. 5	Flax No. 3	Flax No. 5	Flax No. 3	Flax No. 5	Flax No. 3

The seed was sown in rows 3 inches apart at a distance of 1 inch apart in the row and 1 inch deep, one seed being sown by hand in each hole.

The rows reached without intermission across the whole length of the series of six plots, but the seed of each variety occupied alternately a length of 4 feet in every row. By discarding two rows of the plots along both the northern and the southern boundary, and six plants from each row of each plot along the contiguous boundary of adjoining plots, a plot of 3 ft. by 3 ft., or 1 square yard was left in which there are 12 rows with 36 seeds in each, making a total of 432 seeds per plot.

This arrangement is shown in the following diagram. The plot, as originally sown and grown until harvest, is indicated by the figure A B C D, each side of which is 4 feet long. The plot used eventually for comparisons is indicated by the smaller square enclosed in A B C D. The sides of this plot, indicated by thick continuous lines, are each 3 feet in length, and it contains 12 rows 3 inches apart, each of which contains 36 seeds, sown at a distance of 1 inch apart and 1 inch deep.



The discarded portion of the original plot consists of those plants which may have been affected by increased air, light or root space

and also, where the plots touch, by the competition of one variety with another, and which should not, therefore, come within the purview of the comparison. The cultural conditions of the ultimate plot resemble closely those of ordinary field culture, with the exception that each unit space contains an identical number of seeds sown at the same depth and distance apart.

The seed used in these experiments was the produce of two single plants, Nos. 8 and 5, originally selected in 1911 and propagated separately since that year. The visible differences originally observed between the two flaxes continued to be evident this year, but what is equally important, the plants of both varieties, while differing as a whole from each other, showed a remarkable uniformity amongst themselves in length of stalk and time of ripening.

The Value of Pedigreed Selections.

It is interesting to note that the method by which the different varieties of flax mentioned above have been isolated, namely, the separate cultivation of the produce of each plant, is exactly similar to that successfully adopted in the case of many varieties of cereals. With cereals it has been shown that many plants which would come under the heading of one variety exhibit fixed heritable differences, and it is by the separate cultivation of plants exhibiting desirable modifications in any direction that improvement of this important class of agricultural plants has been effected.

The value of pedigreed seed in practice is that it is possible by its use to obtain a higher degree of uniformity of all characters, but especially in those which for commercial reasons must be considered. Thus the stalks composing a crop raised from pedigreed seed will all approximate the same length and ripen at the same time. It is desirable to have uniformity of length, but when this is coupled with uniformity in ripening, a higher commercial value of the flax crop as a whole is at once attained.

The effect of the introduction of pedigreed cereals has, firstly, been the production of crops of much greater uniformity; and, secondly, many of the pedigreed lots that have been introduced have been proved to possess a greater productivity than what may be termed impure, or mixed seed.

The first visible effect of the use of pedigreed flax seed is an increased uniformity in the crop. Some of this uniformity is effected by the substitution of long-stalked plants for short ones, and of plants ripening at the same time for plants ripening at different times. With these considerations in mind, an augmented return of flax per acre as a result of the introduction of seed of good pedigree may be confidently anticipated.

One other experiment was conducted which is a corroboration of at least two of the above. The question in view was whether commercial seed as sold in Ireland is pure, i.e., does it consist of one or of more types of flax? For the purpose of this experiment several hundred seeds from a sample of Riga seed were sown individually in a manner similar to that described in other experiments. As soon as the resulting plants reached their maximum growth it was perfectly clear from their lack of uniformity in length of stalk, from their branching and non-branching habits, from the earliness and lateness in ripening and even from the colour of the flowers that the seed from which they were drawn consisted of a mixture of varieties of flax. Several of the most promising plants were selected and will be propagated as pure cultures in future seasons.

Purity Test of Commercial Flax Seed.

Quite apart from any benefit which may accrue from increased uniformity of the flax crop alone, the composition of the crop as it exists to-day, and the fact as demonstrated by these experiments that the component plants possess various valuable characteristics of a directly heritable nature point to the possibility of isolating, by careful selection, one or more varieties possessing charactersties in a degree in advance of anything at present in general cultivation.

Summary.

(1) It has been shown that flax seed may be artificially dried within certain limits of temperature without impairing its germination.

(2) Flax has been shown to be a self-fertilising plant, directly by artificial means, and indirectly by the cultivation of the seed of single plants which was found to exhibit all the characteristics of limited variability of self-fertilising plants when treated in a similar manner. This leads to the conclusion that the basis of the selection of parent stocks should be *single* plants and not groups of plants.

(3) Seeds of a self-fertilising plant, when sown under similar soil conditions will demonstrate whether the characters for which the parent plant was chosen are inherent or adduced by conditions peculiar to the conditions of environment under which it was grown. *Thus the true value of any selected plant must always be determined finally by the character of its progeny.*

(4) The flax seed in general cultivation is a mixture of many types, varying in character and degree, which are readily capable of selection and propagation as pedigreed cultures.

H. Hunter.

FIELD EXPERIMENTS, 1914.

I.—BARLEY.

The results of experiments conducted in past years have shown that on soils of a heavy nature barleys of the broad-eared type succeed better than Archer, and inversely, Archer is relatively more prolific on light soil than broad-eared varieties. In 1912 and 1913 Beaven's "145" was tested with Archer at several centres in different counties, and the results obtained show that there is no appreciable difference between the two varieties.

Further evidence of the behaviour of Beaven's "145," as compared with Archer I. on light soils was required, however, and one of the experiments this year was conducted on a soil of such nature.

Standwell barley continues to be cultivated in some districts, especially in Co. Louth, and experiments were conducted at two centres there in order to ascertain its value, as compared with Beaven's "145." The size of the plots was one statute acre, as in previous seasons, and at two centres the plots of each variety were duplicated.

The average results of the two series of experiments are shown in the following table:—

—		Average yield of Good Corn per Statute Acre.		Average value of Good Corn per Statute Acre.			Average Total Value with Screenings per Statute Acre.		
		Brls.	Stns.	£	s.	d.	£	s.	d
Expt. 1.	Irish Archer, I.	11	6	8	19	2	9	3	8
	Beaven's "145"	11	10½	9	0	8	9	4	5
Difference in favour of Beaven's "145"		0	4½	0	1	6	0	0	9
Expt. 2.	Beaven's "145"	14	8	11	10	6	11	14	6
	Garton's Regenerated Standwell	11	12	9	6	2	9	9	5
Difference in favour of Beaven's "145"		2	12	2	4	4	2	5	1

The following Table shows, at each centre, the character of the soil and subsoil, and its previous treatment:—

Centre.	Experimenter.	Character of Soil and Subsoil.	Previous Treatment of Land.
1. Bagenalstown, Co. Carlow.	Brown and Crosthwait.	Light gravelly loam. Subsoil—limestone gravel.	1912, Oats. 1913, Roots.
2. Carlingford, Co. Louth.	J. P. Kearney.	Good drift loam. Subsoil—gravel and yellow clay.	1912, Oats. 1913, Turnips.
3. Dundalk, Co. Louth.	O. M'Dowell	Sandy loam. Subsoil—sand and gravel.	1912, Oats. 1913, Roots.

Remarks.

The results of the trials with Beaven's "145" and Archer indicate that there is no difference in yield between these varieties, even on a light gravelly soil and under the very dry weather conditions experienced in 1914. In point of quality "145" was very slightly inferior to Archer. It stood well and proved immune to loss by ears breaking off the straw, despite the dry weather experienced during harvesting—conditions which generally lead to considerable loss with other broad-eared barleys.

In the trials with Garton's Regenerated Standwell, Beaven's "145" proved considerably superior in yield and, at one centre, in quality, and thus in total value per statute acre it exceeded it by £2 5*s.* 1*d.*

These comparisons have only been conducted for one year, and they therefore require further confirmation; but as Standwell proved inferior on all the plots there is good reason to think that Beaven's "145" is a more productive barley in the district in question.

Spratt Barley.

For some years past the Department have carried out tests with Spratt barley on peaty soils, near Birr, King's County. This barley is characterised by a stiff straw, and, during the period in which the observations have been conducted, has produced uniformly good crops. In point of quality it is inferior to Archer and Goldthorpe, but as a feeding barley it is of undoubted value and can be recommended for cultivation on soils of a peaty origin, provided they are sufficiently well drained to obviate the effects of stagnant water.

Spratt does not succeed well on good barley soils, and on such, even if the produce is intended to be utilised for feeding, there is, at present, nothing more productive than barleys of the Archer type.

Small Scale Experiments.

Small scale experiments were conducted by Itinerant Instructors at eight centres in five counties. The varieties tested were Archer, Goldthorpe, and Standwell, and the size of the plots varied from ¼ to ⅛ of an acre. The average of the results is as follows :—

Archer Per Statute Acre.		Goldthorpe Per Statute Acr .		Standwell Per Statute Acre.	
Brls.	Stns.	Brls.	Stns.	Brls.	Stns.
11	8	10	8	9	12

These results are in close accord with those obtained from experiments conducted by the Department in previous years.

Character of Season, 1914.

The early portion of 1914 was very wet and, as in 1913, sowing was not generally commenced until April, which proved an exceptionally dry month. Barley was then sown in a good seed bed and under favourable conditions. Cold, wet weather was experienced in the early part of May, but this was followed by more favourable conditions which lasted until the second week of June, when there was heavy rain, which greatly benefited all crops. The weather in July was favourable for the filling of grain crops. August was a wet month ; in some districts barley, at this time, suffered considerable damage, and when finally marketed was in poor condition. Whilst the yield of barley this year was satisfactory and considerably better than was at one time anticipated, the quality, on the whole, was disappointing.

The Department desire to express their thanks to Messrs. A. Guinness, Son & Co., Ltd., and Mr. J. H. Bennett, Ballinacurra, Co. Cork, who undertook the valuation of the plot samples, and for other technical assistance.

[Table

Table Showing the Yield and Value for each Experimental Plot, 1914.

Name and Address of Experimenter.	Date Sown.	Irish Archer 1. Date Reaped.	Irish Archer 1. Yield per Statute Acre.	Irish Archer 1. Value. Per Brl.	Irish Archer 1. Value. Per Acre.	Beaven's "145." Date Reaped.	Beaven's "145." Yield per Statute Acre.	Beaven's "145." Value. Per Brl.	Beaven's "145." Value. Per Acre	Garton's Regenerated Standwell. Date Reaped.	Garton's Regenerated Standwell. Yield per Statute Acre.	Garton's Regenerated Standwell. Value. Per Brl.	Garton's Regenerated Standwell. Value. Per Acre.
			Brls. Sts.	s. d.	£ s. d.		Brls. Sts.	s. d.	£ s. d.		Brls. Sts.	s. d.	£ s. d.
(a) Brown & Crosthwait, Bagenalstown, Co. Carlow	April 2nd	—	11 7	15 9	9 0 2	Aug. 18th	11 11	15 6	9 1 2				
Screenings, . .		—	0 6	12 0	0 4 6		0 5	12 0	0 3 9				
Total, .		—	11 13	—	9 4 8		12 0	—	9 4 11				
(b)	,,	—	11 5	15 9	8 18 2	,,	11 10	15 6	9 0 2				
Screenings, . .		—	0 6	12 0	0 4 6		0 5	12 0	0 3 9				
Total, . .	—	—	11 11	—	9 2 8	—	11 15	—	9 3 11				
(a) J. P. Kearney, Carlingford, Co. Louth.	March 23rd and 25th	—	—	—	—	Aug. 20th	14 11	16 0	11 15 0	Aug. 20th	12 7	16 0	9 19 0
Screenings, . .		—	—	—	—		0 4	12 0	0 3 0		0 4	12 0	0 3 0
Total,		—		—	—		14 15	—	11 18 0		12 11	—	10 2 0
(b)	,,	—		—	—	,,	14 4	16 0	11 8 0	,,	12 0	16 0	9 12 0
Screenings, . . .	—	—	—	—	—		0 4	—	0 3 0		0 4	12 0	0 3 0
Total, . .	—	—	—	—	—	—	14 8	—	11 11 0	—	12 4	—	9 15 0
(a) O. McDowell, Marsh farm, Dundalk, Co. Louth	March 26th	—	—	—	—	Aug. 25th	14 8	15 9	11 8 5	—	10 13	15 6	8 7 7
Screenings, . .		—	—	—	—		0 8	12 0	0 6 0	—	0 5	12 0	0 3 9
Total,	—	—	—	—	—	—	15 0	—	11 14 5	—	11 2	—	8 11 4

Note I.—All samples have been valued as delivered in Dublin. Note II.—The Screenings have been valued throughout at 12s. per barrel.

II.—MEADOW HAY.

A.—Manurial Test (Old Series).

This series of experiments on the manuring of meadow hay was commenced in 1901 in order to ascertain:—

I. The increase in yield produced by the application of artificial manures as compared with that obtained from a moderate dressing of farmyard manure.

II. The effects of applying complete and incomplete dressings of artificial manures.

The experiments were terminated in 1913 after having been carried out during thirteen consecutive seasons at 217 centres distributed throughout every county in Ireland.

The experiments have generally been conducted on permanent meadow land of average quality such as might be expected to respond to the judicious application of manures.

In view of these facts, therefore, it may be claimed that the results show, in a most convincing manner, the returns that may be expected, under the conditions mentioned, from the various manurial dressings included in the tests.

The manuring of meadow hay on a few particular types of soils, the requirements of which may be expected to differ somewhat from the average, is worthy of further investigation. The Department have already carried out some experiments on peaty soils, the results of which for 1914 are given on page 257.

Reports showing detailed results of the Old Series of experiments have been published annually in the Department's Journal and also in the reports issued each year by the various County Committees of Agriculture.

The principal results of the complete series are given concisely as follows:—

TABLE showing the General Average Results of 217 Experiments carried out during the years 1901-1918, inclusive :—

Year.	Number of Experiments.	Plot 1. No Manure.		Plot 2. 10 tons Farm-yard Manure.		Plot 3. 1 cwt. Nitrate of Soda.		Plot 4. 1 cwt. Nitrate of Soda, 2 cwt. Super-phosphate.		Plot 5. 1 cwt. Nitrate of Soda, 2 cwt. Super-phosphate, 2 cwt. Kainit.	
		• Average yield per Statute Acre.									
		C.	Q.	C.	Q.	C.	Q.	C.	Q.	C.	Q.
1901	10	28	2	38	2	36	3	45	0	48	3
1902	8	29	1	39	2	34	3	40	2	46	2
1903.	27	29	0	41	2	35	0	42	2	47	2
1904	16	28	1	39	3	33	2	39	0	43	3
1905	22	31	1	40	0	38	3	42	1	46	0
1906	14	33	3	43	0	41	0	46	3	51	0
1907	14	32	3	48	3	38	3	42	3	49	3
1908	17	33	3	45	0	40	0	45	3	48	0
1909	15	32	2	47	2	42	2	47	3	52	0
1910	15	34	2	45	1	42	1	47	1	50	1
1911	11	35	0	48	0	44	0	45	0	50	2
1912	23	42	1	57	3	51	1	56	0	62	0
1913	26	40	0	57	0	50	2	55	2	61	3
Average yield, -		*33	0	46	2	40	2	46	2	51	2
Value of Crop; Hay at 2s. per cwt., - - -		£ s. d. 3 6 0		£ s. d. 4 13 0		£ s. d. 4 1 0		£ s. d. 4 13 0		£ s. d. 5 3 0	
Average Cost of Manures, - -		—		2 0 0		0 11 4		0 17 10		1 3 2	
Value of Crop less cost of manures,		3 6 0		2 13 0		3 9 8		3 15 2		3 19 10	

* Average of 250 Centres.

A satisfactory feature of the experiments is that the results have been very uniform throughout. As may be seen from the foregoing Table, the relative positions of the different plots in respect of yield have been almost identical each season.

The points that have been brought out most clearly may be stated briefly as follows :—

(I.) That a dressing of 10 tons of farmyard manure per acre, as applied to Plot 2, usually gives a substantial increase in the crop. In many instances the heaviest yield was obtained from this plot. The average figures for the whole period show, however, that if the hay crop is charged with the whole cost of the manure (4*s*. per ton) a loss of 13*s*. per acre is incurred; but, on the other hand, if only half the cost is charged, as is reasonable, a profit of 7*s*. per acre is obtained.

In this connection it should be remembered that the actual increase in the weight of hay does not fully represent the beneficial effects of an application of dung. Farmyard manure has a lasting influence, and subsequent crops derive considerable benefit from a previous dressing.

(II.) Although the application of nitrate of soda alone—see Plot 3—gave a profitable return on the average, it is not recommended that this manure be used alone for meadow hay, unless under exceptional circumstances. Such a practice is calculated, in a comparatively short time, to cause deterioration in the quality of the produce by encouraging the growth of the coarser grasses to the exclusion of the finer plants.

(III.) This application of nitrate of soda and superphosphate on Plot 4 gave varying results—the average figures show a considerable profit, but at many centres a loss resulted. This manurial dressing cannot, therefore, be regarded as so generally satisfactory as a complete mixture of artificials.

(IV.) The most satisfactory results and the highest average profit were obtained from the complete dressing of artificials applied to Plot 5.

Conclusions:—These results fully justify the advice given in previous reports, viz., that where farmyard manure cannot be spared for application to meadow land, satisfactory results may confidently be expected under ordinary conditions from a complete mixture of artificial manures consisting of:—

1 cwt. Nitrate of Soda, 2 cwt. Superphosphate, 2 cwt. Kainit,	per Statute Acre.

Furthermore, experience has shown that the full return from these manures is not obtained in the hay crop, for the most marked improvement is noticeable both in the quantity and quality of the aftergrass wherever they have been used. This mixture, therefore, is generally recommended for meadow land in Ireland.

The superphosphate and kainit should be applied before the end of February. These two manures may be mixed together, but the mixture should then be sown without delay. The nitrate of soda should be applied separately, at the end of March or early in April.

B.—Supplementary Tests.

The following supplementary tests were carried out in conjunction with the Old Series of experiments already reviewed:—

(I.) Tests devised to ascertain the effect of applying kainit in autumn to meadow land.

In each of the four seasons 1907 to 1910, an extra plot was included in the series. The complete mixture of artificials used on Plot 5 (see Table on page 252) was applied also to this extra plot, but in the latter case the kainit was put on before November 30th, instead of in February.

After four years' trial this plot was omitted as it was found that, although kainit sometimes gave slightly better results when applied in autumn, the increase was seldom likely to repay the extra cost of sowing the manure separately.

(II.) Tests intended to demonstrate the value of basic slag as a manure for meadow hay.

In 1912 and 1913, two plots were manured with superphosphate and basic slag (high grade), respectively, in addition to kainit and nitrate of soda. All the manures were applied in spring in each case.

The average results of these tests were as follows:—

Manures Applied.	Average Yield of Hay per Statute Acre.					
	1913. (26 Centres.)			1912. (23 Centres.)		
	T.	C.	Q.	T.	C.	Q.
1 cwt. Nitrate of Soda, 2 cwt. **Superphosphate**, 2 cwt. Kainit,	3	1	3	3	2	0
1 cwt. Nitrate of Soda, 2 cwt. **Basic Slag** (high grade), 2 cwt. Kainit,	2	19	3	3	1	3

The average results of these tests as reproduced in the above Table represent very fairly also the returns from individual centres.

In 1912 the higher yield was obtained from superphosphate at nine centres and from basic slag at thirteen centres (in one case the yields were equal). In 1913 superphosphate gave slightly better results than basic slag at seventeen out of the twenty-six centres.

Neither manure was uniformly superior on any particular kind of soil; thus, even on heavy clay soils basic slag did not give uniformly better results than superphosphate, nor were markedly higher yields produced by the latter manure on light or medium soils.

Whilst it is most desirable that further trials should be carried out before a definite pronouncement be made as to the relative merits of these two phosphatic manures when applied to meadow hay, the experimental results obtained up to the present tend to show that superphosphate and basic slag are practically of equal value when used in conjunction with nitrate of soda and kainit.

It is worthy of note that basic slag gave slightly better results in the wet season of 1912 than in the dry summer of 1913, which may be an indication that the immediate effects of a spring application of this manure to meadow hay are realised to the greatest extent in a wet season.

C.—New Series—Liquid Manure Experiments.

This series of experiments, commenced in 1911, designed to show the effects of the application of liquid manure to the hay crop, was repeated on the same lines in 1914. This season's experiments were carried out by Agricultural Instructors at 5 centres in 4 counties, and by Agricultural Overseers at 76 centres in Congested Districts.

Detailed results of these experiments are given in the Table on page 256, but for easier reference a summary of the results obtained in 1914 and the three previous years is shown in the following Table :—

Plot.	Manures applied per Statute Acre.	1914. (81 Centres.)		1911–13. (168 Centres.)	
		Average yield of Hay per Statute Acre.	Increase due to Manures.	Average yield of Hay per Statute Acre.	Increase due to Manures.
		T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.
1	No Manure, . . .	1 17 3	—	2 2 3	—
2	16 tons Farmyard Manure,	2 13 2	0 15 3	2 18 1	0 15 2
3	16 tons Liquid Manure, .	2 13 3	0 16 0	2 19 3	0 17 0
4	1 cwt. Nitrate of Soda, 2 cwt. Superphosphate, 2 cwt. Kainit,	2 13 0	0 15 1	2 18 3	0 16 0

It will be seen from the foregoing results that whilst there is very little difference in the average yield from any of the three manured plots, the slight superiority of the liquid manure plot observed in the three previous years has been maintained during the past season.

The returns from individual centres show that rotation hay, composed largely of Italian rye-grass, responds well to applications of liquid manure, while on old meadow hay at one centre the effect of an application of liquid manure nearly trebled the yield obtained on the unmanured plot.

The results of these experiments up to the present indicate the interesting fact that equally good returns were obtained from applications of liquid manure to meadow hay in both wet and dry seasons.

These results afford ample evidence as to the value of liquid manure as a dressing for hay, whether first-crop, second crop, or permanent meadow, and should induce farmers to try an experiment on their own land.

The value of farmyard manure is everywhere realised and the results of the Old Series of Experiments, given in this leaflet, have proved that the complete mixture of artificial manures applied to Plot 5 (see page 252) may generally be relied upon to give profitable returns ; it only remains, therefore, to state that the value of liquid manure, which during the four years' experiments under review has proved superior to a complete mixture of artificials, is not yet fully appreciated by farmers in this country.

At present the liquid manure on many holdings is entirely lost whereas it could be collected at small cost and applied to grass land during winter when farm work is slack, with benefits out of all proportion to the expense incurred.

Liquid Manure Test.—Table showing the Returns per Statute Acre from each Centre.

Name and Address of Farmer.	Crop.	Character of Soil.	Plot 1. No Manure.	Plot 2. 16 tons Farmyard Manure (applied before 15th February).	Plot 3. 16 tons Liquid Manure (applied one-half in February, and one-half in April).	Plot 4. 1 cwt. Nitrate of Soda (applied during last half of March); 2 cwt. Superphosphate, 2 cwt. Kainit (applied before 15th February).
			T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.
A. Patterson, Killynure, Co. Down	2nd Crop	Loam	2 0 2	2 19 0	4 1 0	3 0 0
Show Grounds, Balmoral, Belfast, Co. Down	Old Meadow	Cold, Heavy Clay	1 12 2	3 2 2	4 15 0	2 2 2
P. Whitty, Borris, Co. Kilkenny	1st Crop	Medium Loam	1 17 1	2 13 2	2 11 1	3 0 1
M. Holland, Cullohill, Queen's Co.	2nd Crop	Loam.	1 11 1	2 4 2	2 3 2	2 2 0
G. Brown, Kilmacthomas, Co. Waterford	1st Crop	Shingly Loam	1 9 2	2 17 2	2 17 2	1 17 0
Average Yield per Statute Acre			**1 14 1**	**2 15 2**	**3 5 3**	**2 8 1**
Increase due to Manures			—	**1 1 1**	**1 11 2**	**0 14 0**
Congested Districts (average of 76 Experiments)			**1 18 1**	**2 13 2**	**2 13 0**	**2 13 2**
Increase due to Manures			—	**0 15 1**	**0 14 3**	**0 15 1**
Average results of both County and Congested District Experiments (81 Experiments)			**1 17 3**	**2 13 2**	**2 13 3**	**2 13 0**
Increase due to Manures			—	**0 15 3**	**0 16 0**	**0 15 1**

D.—Experiments on Peaty Soils.

The results of previous experiments have made it possible to recommend with confidence a standard mixture of artificial manures for the meadow hay crop on average soils.

It was decided, however, to arrange for experiments to be carried out on peaty soils to ascertain if any advantage would be gained by varying the standard mixture for the meadow hay crop on such soils.

Some preliminary tests were made in 1912 and 1913, and the results obtained at ten centres were published in this report for 1913.

In view of the data thus obtained the experiment was arranged in 1914 to test the effects of the application of nitrate of soda along with a dressing of basic slag and kainit, and also to compare the standard mixture with a similar dressing in which basic slag was substituted for superphosphate. All the manures were applied in spring.

The following Table shows the nature and results of the tests :—

Name and Address of Farmer	Percentage of Organic Matter (Department's Analysis)	Plot 1. No Manure	Plot 2. 2 cwt. Basic Slag 2 cwt. Kainit	Plot 3. ½ cwt. Nitrate of Soda 2 cwt. Basic Slag 2 cwt. Kainit.	Plot 4. 1 cwt. Nitrate of Soda 2 cwt. Basic Slag 2 cwt. Kainit.	Plot 5. 1 cwt. Nitrate of Soda 2 cwt. Superphosphate 2 cwt. Kainit.
		T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.
D. M'Cormack, Dunnyvadden, Co. Antrim	18·1	1 7 3	1 13 1	1 19 0	2 1 3	2 8 1
J. M'Elroy, Drumwhinney, Kesh, Co. Fermanagh	17·5	2 2 2	3 1 3	3 4 1	3 10 1	3 16 3
S. Coulson, Belmont, Clones, Co. Fermanagh	20·76	1 4 1	1 13 2	1 14 2	1 15 3	1 18 2
M. Hanrahan, Inch, Listowel, Co. Kerry	33·54	1 17 2	2 13 2	2 16 2	2 18 0	2 15 2
J. O'Sullivan, Inch, Listowel, Co. Kerry	21·54	1 5 0	1 18 0	2 0 2	2 1 2	2 4 0
Patrick Quinn, Donadea, Naas, Co. Kildare	22·55	1 1 2	1 14 0	1 15 0	1 16 2	2 0 1
T. Stanley, Naas, Co. Kildare	49·77	1 12 0	1 14 1	1 18 2	1 15 2	2 1 1
F. Doorley, Clonaheen, Shinrone, King's Co.	35·03	1 5 1	1 14 1	1 18 3	2 0 3	2 3 0
S. Roe, Killavilla, Roscrea, King's Co.	50·9	0 19 1	1 4 0	1 5 1	1 9 2	1 12 2
M. Gilmartin, Breaffy, Co. Mayo	18·9	1 5 2	1 9 3	1 12 2	2 0 0	2 2 0
T. Beirne, Cultyconway, Co. Roscommon	19·1	2 2 0	3 1 0	3 19 2	4 5 0	3 16 1
P. Farrell, Mountdillon, Co. Roscommon	24·58	1 0 0	1 15 2	1 19 0	1 19 2	2 0 0
M. Lynch, Castlepollard, Co. Westmeath	14·42	1 3 2	1 12 1	1 17 0	2 4 2	1 19 2
Average Yield per Statute Acre		**1 8 0**	**1 18 3**	**2 3 0**	**2 6 0**	**2 7 2**
Increase due to Manures		—	**0 10 3**	**0 15 0**	**0 18 0**	**0 19 2**
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cost of Manures		—	**0 13 0**	**0 19 0**	**1 5 0**	**1 5 0**
Value of Crop, less cost of Manures Hay at 2s. per cwt.		**2 16 0**	**3 4 6**	**3 7 0**	**3 7 0**	**3 10 0**

In the above estimates the different manures were valued per ton as follows :—nitrate of soda, £12 ; superphosphate, £3 10*s.* ; basic slag, £3 10*s.* ; kainit, £3.

Since the term "peaty" soil is often used in a rather indefinite sense, it was decided to determine the amount of organic matter in a representative sample of soil from the land under each experiment in order that the effects of the various manures might be considered in conjunction with the amount of vegetable matter in the soil.

That there is a considerable variation in the amounts of organic matter in so-called "peaty" soils is evident from the above analytical results : for instance the highest figure recorded, 50·9 per cent. is more than treble that of the lowest, 14·42 per cent.

At this stage of the enquiry it may be noted that the standard mixture of artificial manures recommended and now generally employed for the hay crop has proved as suitable for peaty as for other soils. Until, therefore, further and more minute investigations have been made which may indicate a better mixture, farmers are

not likely to make any serious mistake in applying the standard manure to peaty soils.

The Manuring of Pasture Land.

There is no doubt that the application of artificial manures to much of the second-rate grazing land of this country would give profitable returns. Hitherto it has been customary to apply a phosphatic manure, such as basic slag or superphosphate.

Both of these manures can generally be relied upon to give good results. In every county in Ireland the value of basic slag has been demonstrated, particularly on damp or moory land growing coarse, sour herbage, not readily eaten by stock. On such pastures farmers need have no hesitation in applying basic slag at the rate of about 8 cwt. per statute acre, and no further dressing will be required for several years. On lighter and drier soils more certain results will be obtained from the use of superphosphate, and under such conditions the addition of kainit is recommended. These two manures may be purchased separately, and mixed together in equal parts, 4 cwt. of the mixture being applied per statute acre, or they may be bought blended together in the form of Potassic Superphosphate, and the same quantity applied per statute acre. This dressing, however, should be repeated every second or third year.

Since the manurial requirements of the hay crop and pasture are similar in many respects, the question arises as to whether it might not be profitable to include either nitrate of soda or sulphate of ammonia in the dressing for pasture in the same proportion as for the hay crop. The striking increase in yield obtained when liquid manure, which is highly nitrogenous, is applied to meadow land is clearly set forth in this report, and the fact that equally satisfactory results are secured from its application to pastures seems to indicate that the standard dressing of artificials recommended for hay would give a profitable return on pastures also.

The Department have not yet carried out any definite experiments to test this matter, but it is suggested that the point is worthy of consideration by farmers, especially where land recently laid down to grass is being grazed.

III.—POTATOES.

I.—Manurial Test (Old Series).

This series of experiments, commenced in 1901 with the object of ascertaining what use can be made of artificial manures by way of supplementing applications of farmyard manure to the potato crop, was brought to a close in 1911, after the tests had been repeated during eleven consecutive seasons.

The most notable features of these experiments, probably unique in several respects in work of this nature, are :—

(I.) The duration of the trials—eleven years—during which period seasons differing widely in character were experienced.

(II.) The scope of the experiments—the tests were carried out in every county in Ireland, on most kinds of soil on which potatoes are habitually grown, and with practically all the better-known maincrop varieties.

(III.) The uniformity of the results throughout the entire period.

The conclusive results of this series of experiments have made it possible to recommend with the utmost confidence, a system of manuring proved to be admirably suited to most of the conditions under which potatoes are grown in this country. Furthermore, the information derived from these tests has been of the greatest assistance in designing the New Series of experiments, and also those recently commenced in sea-board localities and on peaty soils.

Detailed returns from individual experimental centres were published annually in the Department's Journal for each of the years 1901 to 1908; subsequently, however, the number of experiments carried out each season became so large that it was found impossible to adhere to this system, and, accordingly, general summaries only were published. It may be stated, however, that each County Agricultural Committee has published, from year to year, detailed results of tests made by their Agricultural Instructor. Thus potato growers have been enabled to consult the general results for the whole country as set forth in the Department's reports, and also the local returns as published by their County Agricultural Committee.

A general summary of the complete results of the experiments for the entire period 1901 to 1911, is reproduced in the following Table :—

Manurial Experiments (Old Series).

Table—Showing a General Summary of the Complete Series, including the Returns from 353 Centres during the eleven years, 1901 to 1911 inclusive.

Year.	No. of Experiments.	Plot 1. No Manure.	Plot 2. 15 Tons Farmyard Manure.	Plot 3. 20 Tons Farmyard Manure.	Plot 4. 15 Tons Farmyard Manure, 1 cwt. Sulphate of Ammonia.	Plot 5. 15 Tons Farmyard Manure, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate.	Plot 6. 15 tons Farmyard Manure, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.	Plot 7. 15 Tons Farmyard Manure, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate, 1 cwt. Sulphate of Potash.
		T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
1901	17	4 4	9 15	10 13	10 16	11 12	12 1	—
1902	23	4 7	7 19	8 18	8 19	9 16	10 11	—
1903	20	3 1	7 9	8 2	8 6	9 10	10 5	—
1904	32	3 12	7 16	8 14	8 10	9 9	10 9	—
1905	33	4 13	9 1	10 3	9 16	10 5	11 5	—
1906	37	3 12	7 6	7 19	7 17	8 16	9 18	9 13
1907	59	3 12	7 13	8 11	8 14	9 9	10 5	10 3
1908	49	4 9	9 0	9 13	9 19	10 14	11 14	11 9
1909	32	4 4	8 9	9 7	9 10	10 2	10 19	10 18
1910	32	4 7	8 12	9 15	9 12	10 14	11 10	11 5
1911	19	4 3	8 9	9 6	9 7	10 3	10 18	10 15
Average Total Yield,		**4 0**	**8 4**	**9 2**	**9 3**	**9 19**	**10 17**	***10 12**
Average Yield of Small Potatoes,		1 3	1 8	1 11	1 11	1 13	1 12	1 17
		£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*
Value of Crop, Saleable at 2s. per cwt. Small, at 1s. per cwt.,		**6 17 0**	**15 0 0**	**16 13 0**	**16 14 0**	**18 5 0**	**20 2 0**	**19 7 0**
Cost of Manures,		—	**3 0 0**	**4 0 0**	**3 13 8**	**4 6 0**	**4 16 5**	**4 17 1**
Value of Crop, after deducting Cost of Manures,		**6 17 0**	**12 0 0**	**12 13 0**	**13 0 4**	**13 19 0**	**15 5 7**	**14 9 11**

* Average of 228 centres only.

The above figures represent the returns per statute acre.

The principal results of the tests may be briefly epitomised as follows :—

(I.) Comparing Plots 2 and 3, manured with 15 and 20 tons of farmyard manure respectively, it is seen that, if no account be taken of the slightly greater cost of applying the heavier dressing of dung there is a balance of 13*s.* per acre in favour of the more liberal manuring. It must be borne in mind, however, that these figures do not fully represent the value of dung, which possesses a considerable "residual" value.

(II.) The addition of 1 cwt. sulphate of ammonia to a dressing of 15 tons of farmyard manure, on Plot 4, gave a profitable return each year.

(III.) On Plot 5, the addition of 4 cwt. superphosphate to a dressing of 1 cwt. sulphate of ammonia and 15 tons of dung resulted in a profit in nine years out of eleven; the general average figures show a return of 18*s*. 8*d*. over Plot 4.

(IV.) The largest average yield and the highest average profit have been obtained each year from the plot manured with a complete mixture of artificials and a moderate dressing of farmyard manure.

(V.) Comparing Plots 6 and 7, manured with muriate of potash and sulphate of potash respectively, in addition to sulphate of ammonia, superphosphate and dung, it is seen that in each year a slightly higher yield was obtained from the muriate of potash plot.

Conclusions:—The results of this Old Series of experiments, and also those of the New Series, particulars of which are given below, fully justify the advice given in previous reports, viz., that, as a rule, and especially where the supply is limited, as is usually the case, farmers should apply dung in moderate quantities and supplement it with suitable artificial manures. The experiments show in a most convincing manner that, on most soils, satisfactory results may confidently be expected from the application of :—

$$\left.\begin{array}{l}\text{1 cwt. Sulphate of Ammonia,}\\ \text{4 cwt. Superphosphate,}\\ \text{1 cwt. Muriate of Potash,}\end{array}\right\}\text{ per Statute Acre,}$$

in addition to a moderate dressing of farmyard manure.

The artificial manures should be applied in the drills over the farmyard manure.

The above mixture of artificial manures is also suitable for potatoes grown without farmyard manure, but in this case the quantities should be increased by one-half.

II.—Manurial Test (New Series).

One of the first showings of the Old Series of experiments was, that the most generally satisfactory manurial dressing for the potato crop consists of a moderate quantity of farmyard manure in conjunction with a complete mixture of artificials. Whilst the mixture already quoted had proved eminently satisfactory, it was thought desirable to ascertain to what extent, if any, the quantity of any manurial ingredient might be modified. Accordingly, in 1908 a new series of experiments was devised with the object of ascertaining what quantity of each of the three ingredients, nitrogen, phosphate and potash, such a complete mixture should contain.

In these tests the same three manures, sulphate of ammonia, superphosphate and muriate of potash, were applied to each plot in addition to a moderate dressing of farmyard manure, but the quantity of each artificial manure was varied.

In 1914 these tests were carried out at 45 centres in 23 counties. For convenient reference and comparison, the average results for 1914, and also for the previous six years, are summarised briefly in the following Tables.

In each Table, Plot No. 3, manured with the standard mixture of artificials, viz., 1 cwt. sulphate of ammonia, 4 cwt. superphosphate, 1 cwt. muriate of potash, forms the basis of comparison for the remainder of the plots.

(a) **Varying quantities of Superphosphate.**

Plot.	Manures applied per Statute Acre.	1914. (45 Centres.)		Average of six years 1908-13. (270 Centres.)	
		Total yield per Statute Acre.	Value of Crop after deducting cost of Manures.	Total yield per Statute Acre.	Value of Crop after deducting cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
2	3 cwt. Superphosphate with Dung, Sulphate of Ammonia and Muriate of Potash,	11 3	15 14 0	10 15	14 18 0
*3	4 cwt. Superphosphate, do.,	11 10	16 3 6	11 1	15 8 1
4	5 cwt. Superphosphate, do.,	11 8	15 17 0	11 3	15 7 0

(b) **Varying quantities of Sulphate of Ammonia.**

Plot.	Manures applied per Statute Acre.	1914. (45 Centres.)		1908-13. (270 Centres.)	
		Total yield per Statute Acre.	Value of Crop after deducting cost of Manures.	Total yield per Statute Acre.	Value of Crop after deducting cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
3	1 cwt. Sulphate of Ammonia, with Dung, Superphosphate and Muriate of Potash,	11 10	16 3 6	11 1	15 8 1
5	1½ cwt. Sulphate of Ammonia, do.,	11 6	15 8 9	11 6	15 10 5
6	2 cwt. Sulphate of Ammonia, do.,	11 11	15 12 0	11 12	15 11 5

(c) Varying quantities of Muriate of Potash.

Plot.	Manures applied per Statute Acre.	1914. (45 Centres.) Total yield per Statute Acre.	1914. (45 Centres.) Value of Crop after deducting cost of Manures.	1908-13. (270 Centres.) Total yield per Statute Acre.	1908-13. (270 Centres.) Value of Crop after deducting cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
3	1 cwt. Muriate of Potash, with Dung, Superphosphate and Sulphate of Ammonia,.	11 10	16 3 6	11 1	15 8 1
7	1½ cwt. Muriate of Potash, do., .	11 6	15 12 0	11 13	15 12 1
8	2 cwt. Muriate of Potash, do., .	11 10	15 14 6	11 9	15 11 11

Since 1912 an extra plot, No. 9, has been included in the experiments with the object of showing the effects of the application of three-quarters of the amount of the standard dressing of artificials applied on Plot 3.

The following Table shows the returns obtained from dung alone, dung and three-quarters of the standard dressing of artificials, and dung with the full quantity of artificials, respectively :—

(d) Varying quantities of the Standard Mixture.

Plot.	Manures applied per Statute Acre.	1914. (45 Centres.) Total yield per Statute Acre.	1914. (45 Centres.) Value of Crop after deducting cost of Manures.	Average of two years 1912-13. (93 Centres.) Total yield per Statute Acre.	Average of two years 1912-13. (93 Centres.) Value of Crop after deducting cost of Manures.
		T. C	£ s. d.	T. C.	£ s. d.
1	15 tons Farmyard Manure,	9 1	13 8 0	8 1	11 11 7
9	15 tons Farmyard Manure, 4½ cwt. Standard Mixture of Artificials (¾ dressing),	10 13	15 0 8	10 1	13 19 11
3	15 tons Farmyard Manure, 6 cwt. Standard Mixture of Artificials (Full dressing),	11 10	16 3 6	10 14	14 13 6

The prices per ton put upon the artificial manures in 1914 were as follows :—superphosphate, £3 10*s.*; basic slag, £3 10*s.*; sulphate of ammonia, £15 10*s.*; nitrate of soda, £12; muriate of potash, £11.

From the commencement, the results of this New Series of experiments have been very uniform. They show clearly that it is not

advisable, as a rule, to apply any one of the three manures, superphosphate, sulphate of ammonia and muriate of potash, in greater quantities than those recommended in the standard mixture. Although the additional quantities used in these experiments produced, on the average, a sufficient increase in yield to repay the extra expenditure, nevertheless, in many cases the application of heavy dressings was not satisfactory. In 1914 the standard dressing has on the average given decidedly the best results.

On the other hand, of all the plots manured with artificials, the lowest average yields and smallest profits were obtained from the two plots (No. 2, Table (*a*) and No. 9, Table (*d*)), which received smaller quantities than those specified in the standard mixture.

These results do not warrant any change in the standard mixture which has proved so eminently satisfactory throughout both Series of experiments.

III.—Manurial Tests on Peaty Soils.

In view of the fact that very few of the Old or New Series o manurial experiments were carried out on pronounced peaty soils, the Department decided to investigate more thoroughly the manurial requirements of the potato crop on this class of land. Accordingly, during the seasons 1912–13 a number of preliminary tests were carried out in order to ascertain the best lines on which to attack the problem systematically. The results of these experiments were published in the Report for 1913.

After careful consideration of the results obtained from the preliminary tests, the experiment was re-modelled for 1914, with a view to obtaining definite information on the following points:—

(I.) The effect of the application of the standard mixture of artificial manures, viz.:—1 cwt. sulphate of ammonia, 4 cwt. superphosphate, and 1 cwt. muriate of potash, along with farmyard manure as compared with dung alone.

(II.) The effect of (*a*) reducing the quantity of sulphate of ammonia to ½ cwt. per acre, and (*b*) of omitting it entirely from the mixture.

(III.) The effects of various mixtures of artificial manures applied alone.

The detailed results are given in Table I. on pages 274-5, but a reference to the summary table below will show the nature of the experiment and the average results obtained from 17 centres in 13 counties in 1914.

Manurial Test on Peaty Soils.

Summary of Results.

Plot.	Manures Applied per Statute Acre.	Total Yield per Statute Acre. (17 Centres).	Value of Crop after deducting cost of Manures.
		T. C.	£ s. d.
1	15 tons Farmyard Manure . .	8 8	11 14 0
2	15 tons Farmyard Manure, . . 1 cwt. Sulphate of Ammonia, . . 4 cwt. Superphosphate . . . 1 cwt. Muriate of Potash, . .	10 16	14 5 6
3	15 tons Farmyard Manure, . . ½ cwt. Sulphate of Ammonia, . . 4 cwt. Superphosphate, . . . 1 cwt. Muriate of Potash. . .	10 12	14 9 3
4	15 tons Farmyard Manure . . 4 cwt. Superphosphate, . . . 1 cwt. Muriate of Potash. . .	10 5	14 7 0
5	1½ cwt. Sulphate of Ammonia, . 6 cwt. Basic Slag, ... 1½ cwt. Muriate of Potash. . .	9 12	14 8 3
6	1½ cwt. Nitrate of Soda, . . . 6 cwt. Basic Slag, ... 1½ cwt. Muriate of Potash. . .	9 8	14 2 6
7	1½ cwt. Nitrate of Soda, . . . 6 cwt. Superphosphate, . . . 1½ cwt. Muriate of Potash. . .	10 3	15 6 6
8	1½ cwt. Sulphate of Ammonia, . 6 cwt. Superphosphate, . . . 1½ cwt. Muriate of Potash. . .	10 8	15 11 3

Some of the returns from individual centres differ from the average figures but these represent very fairly the general results.

It would be premature at this stage to attempt to draw definite conclusions but the following are the chief points of interest regarding the results so far obtained :—

(I.) The application of the standard mixture of artificials along with a moderate dressing of farmyard manure has produced the heaviest average yield and has returned a substantial profit.

(II.) The reduction of the sulphate of ammonia in the standard mixture or its total exclusion therefrom has resulted in a slightly reduced yield but at the same time a rather higher average net profit per acre. Similar results were obtained in the previous year, and it is

interesting to note that the summers of 1913 and 1914 were exceptionally fine and dry, but in 1912 when the summer was cold and wet exactly opposite results had to be recorded.

(III.) On the average practically as heavy crops have been obtained on peaty soils from the use of 9 cwt. of a complete mixture of artificials alone as from the use of dung supplemented with the normal dressing of 6 cwt. of artificials.

(IV.) In combination with other artificial manures basic slag has given inferior results to superphosphate.

(V.) The highest average net profit per acre has been obtained from Plot 8 to which was applied the standard mixture of artificials at the rate of 9 cwt. per acre without dung. It should be noted, however, that the full cost of the farmyard manure, viz.:—4*s*. per ton is charged against the potato crop and no allowance is made for the unexhausted residue which is considerable; on the other hand no charge is included in respect of the extra labour involved in the application of the dung.

IV.—Manurial Tests with Seaweed.

In many districts near the coast, seaweed is used to a considerable extent instead of farmyard manure for potatoes. Farmers frequently cart the weed long distances, so convinced are they of its fertilising value. Analyses show that seaweed and farmyard manure are very similar in composition except that, as a rule, the former contains rather more potash but less phosphate than the latter.

During the past three years a series of tests has been carried out with potatoes in sea-board localities in order to determine:—

(I.) The relative values of seaweed and farmyard manure.

(II.) The most suitable artificial manures to use in conjunction with seaweed.

Detailed results for 1914 are given in Table II., on pages 276-7.

In estimating the returns from the different plots, seaweed has been valued at 3*s*. per ton.

The results are summarised for the purpose of easy reference.

Manurial Test with Seaweed.

Summary of Results.

Plot.	Manures applied per Statute Acre.	1914. (13 Centres.) Total yield per Statute Acre.		1914. (13 Centres.) Value of Crop after deducting cost of Manures.			Average of Two Years, 1912-13. (18 Centres.) Total yield per Statute Acre.		Average of Two Years, 1912-13. (18 Centres.) Value of Crop after deducting cost of Manures.		
		T.	C.	£	s.	d.	T.	C.	£	s.	d.
1	15 tons Farmyard Manure,	10	5	15	5	0	9	14	14	8	4
2	15 tons Seaweed,	9	11	14	19	0	8	9	13	1	4
3	15 tons Seaweed, 1 cwt. Sulphate of Ammonia 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.	12	4	18	4	6	12	2	17	12	9
4	15 tons Seaweed, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.	11	4	16	18	0	10	19	16	7	7
5	15 tons Seaweed, 1 cwt. Sulphate of Ammonia 4 cwt. Superphosphate.	11	16	18	1	6	11	17	17	18	9
6	15 tons Seaweed, 4 cwt. Superphosphate.	11	0	17	2	0	10	13	16	8	0

The average results for each of the three years have been remarkably uniform and they would seem to indicate that

(I.) Weight for weight, seaweed seldom produces as heavy a crop of potatoes as does farmyard manure.

(II.) Muriate of potash generally has less effect when used with seaweed than when applied with dung.

(III.) Seaweed gives the best results on light soils and possibly in a dry season.

V.—The Standard Mixture.

1 cwt. Sulphate of Ammonia.
4 cwt. Superphosphate.
1 cwt. Muriate of Potash.

In the experiments which have been carried out during the past fourteen years the suitability of the standard mixture of artificial manures for potatoes has been emphasized repeatedly.

The outstanding feature of the tests made during 1914 is that in each of three Series of manurial experiments the highest average

net return per acre has been obtained from the plot to which this mixture was applied, viz. :—

(*a*) in the Manurial Test (New Series) plot 3—standard mixture together with dung,

(*b*) in the Manurial Tests on Peaty Soils, plot 8—standard mixture alone at the rate of 9 cwt. per statute acre,

(*c*) in the Manurial Tests with Seaweed, plot 3—standard mixture applied along with seaweed.

The Department cannot too strongly urge upon farmers the desirability of using this well-balanced mixture when they require artificial manures for potatoes.

If used with farmyard manure it should be applied at the rate of 6 cwt. and if without dung at the rate of 9 cwt. per statute acre.

VI.—Variety Test.

This experiment, designed to test the relative cropping capacities of different varieties of potatoes, was conducted at 54 centres in 27 counties by Agricultural Instructors, and by Agricultural Overseers at 47 centres in Congested Districts.

The results of these tests in 1914 are summarised in the following Tables.

(*a*)—*County Experiments.*

Variety of Potato.	Saleable.		Small and Diseased.		Total.	
	T.	C.	T.	C.	T.	C.
Maincrop Varieties—						
Duchess of Cornwall,	11	9	1	12	13	1
Up-to-Date,	11	4	1	14	12	18
Arran Chief,	11	4	1	11	12	15
Summit,	10	19	1	10	12	9
Irish Queen,	10	1	1	2	11	3
Shamrock,	9	16	1	4	11	0
Champion,	7	17	2	7	10	4
Mid-Season Varieties—						
Abundance,	8	18	1	18	10	16
British Queen,	8	16	1	18	10	14

(*b*)—*Congested District Experiments.*

Variety of Potato.	Saleable.		Small.		Diseased.		Total.	
	T.	C.	T.	C.	T.	C.	T.	C.
Main-Crop Varieties—								
Summit,	11	9	1	6	0	3	12	18
Up-to-Date,	10	15	1	7	0	13	12	15
Arran Chief,	11	1	1	4	0	6	12	11
Northern Star,	10	5	1	11	0	8	12	4
Bobbie Burns,	9	17	1	16	0	7	12	0
Arran's Hope,	10	2	1	2	0	7	11	11
Irish Queen,	9	19	0	18	0	6	11	3
Champion,	8	7	1	10	0	17	10	14

Remarks.

Duchess of Cornwall and Up-to-Date are so similar that they are regarded as identical. This type of potato is now known in every part of Ireland, and it is most commonly planted when a heavy yield is the main consideration.

Arran Chief is a white round potato of recent introduction, and is one of the most promising of the newer varieties. In these experiments the yield of saleable potatoes has fallen but slightly below that of any other kind. The cooking quality of the tubers is good, and the variety resists disease well, consequently it is with confidence that farmers are recommended to give it a trial.

Summit produced the heaviest yield in both these series of experiments in 1913, but during the past season its superiority has not been quite so marked. This is one of the heaviest croppers and probably the best disease resister of all the varieties tested. As regards cooking quality however, variable reports have been received each season.

As regards the other varieties tested it may be noted that Irish Queen has produced a considerably heavier crop of saleable potatoes than Champion, and as this variety is a better disease resister and in cooking quality is but slightly inferior it is recommended instead of Champion.

VII.—Sprouting Seed Potatoes.

Late Varieties.

During the past season, these experiments were carried out in ten counties at thirty-eight centres. At each centre the tests were made under similar conditions as to soil, manuring, variety, and cultivation, the only difference being that the seed for one plot was sprouted (as explained in the Department's leaflet No. 58) and the seed for the other plot was not. The average results were as follows :—

County.	No. of Experiments.	Average Yield per Statute Acre.												Average gain in Yield due to Sprouting.	
		Sprouted.						Unsprouted.							
		Saleable.		Small.		Total.		Saleable.		Small.		Total.			
		T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.
Armagh,	8	11	3	2	4	13	7	9	1	1	14	10	15	2	12
Cavan,	3	8	5	2	9	10	14	7	7	1	18	9	5	1	9
Cork,	3	9	15	2	15	12	10	7	17	2	8	10	5	2	5
Down,	3	14	11	1	12	16	3	11	14	2	2	13	16	2	7
Kerry,	1	9	3	1	14	10	17	6	14	1	18	8	12	2	5
Kilkenny,	2	6	5	2	6	8	11	4	2	2	5	6	7	2	4
Limerick,	2	12	17	1	14	14	11	9	18	1	8	11	6	3	5
Londonderry,	8	8	14	1	10	10	4	7	3	1	7	8	10	1	14
Tipperary (S),	2	7	2	1	13	8	15	5	7	1	8	6	15	2	0
Wexford,	6	8	16	1	8	10	4	7	13	1	11	9	4	1	0

Summary of Results of Experiments on the Sprouting of Late Potatoes for twelve years, 1903-14.

Year.	No. of Experiments.	Average Yield per Statute Acre. Sprouted Seed.		Average Yield per Statute Acre. Unsprouted Seed.		Average gain in Yield due to Sprouting.	
		T.	C.	T.	C.	T.	C.
1903, . . .	12	11	1	9	8	1	13
1904, . . .	34	11	6	8	13	2	13
1905, . . .	91	12	17	10	16	2	1
1906, . . .	67	11	9	9	2	2	7
1907, . . .	67	10	6	8	6	2	0
1908, . . .	67	13	0	10	15	2	5
1909, . . .	50	12	19	10	4	2	15
1910, . . .	288	12	5	10	1	2	4
1911, . . .	322	12	13	10	18	1	15
1912, . . .	354	12	4	10	9	1	15
1913, . . .	47	11	12	9	11	2	1
1914, . . .	38	11	13	9	13	2	0
Average of 1,437 tests, . .		12	5	10	6	1	19

The advantages of the system of sprouting seed of late varieties of potatoes are fully set forth in the Department's leaflet No. 58. These experiments, however, clearly show that an average increase in yield, due to sprouting, of approximately two tons per statute acre may be expected.

VIII.—Cultivation Test.

This experiment was designed to illustrate the advantages of adopting up-to-date methods in the cultivation of potatoes. The old method of growing potatoes consisted of taking seed directly from the pit for planting in the spring and of applying only farmyard manure to the crop. Experiments have been carried out on an extensive scale to show the benefits resulting from the individual operations of (*a*) sprouting seed potatoes in boxes before planting; (*b*) the use of a suitable mixture of artificial manures; and (*c*) the spraying of the crop. In this test these three operations have been combined and tested against the older and less intensive method. In 1914 the experiment was carried out at 31 centres in 14 counties. The results are given in Table III., on pages 278-9, but these have been summarised briefly in the following table:—

[Table.

Cultivation Test.—Summary of Results.

Plot 1. Seed planted whole directly from pit—20 tons dung only applied; crop left unsprayed.				Plot 2. Seed sprouted; 20 tons dung and 6 cwt. Standard mixture of artificials for Potatoes applied: crop sprayed twice.			
Average Yield per Statute Acre.							
Saleable	Small	Diseased	Total	Saleable	Small	Diseased	Total
T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
6 14	1 7	0 9	8 10	10 16	1 9	0 5	12 10
Increase due to improved methods				4 2	0 2	decrease 4	4 0

The tests were carried out with the leading maincrop varieties under conditions as uniform as possible, and at each centre seed from the same source was selected, but for one plot it was sprouted in boxes during the winter and for the other plot it was allowed to remain in the pit until spring. It will be seen from the table that on the average the total increase in yield from Plot 2 over Plot 1 was exactly 4 tons per statute acre. The increase in the yield of saleable potatoes was rather more than 4 tons per acre and there was a smaller quantity of diseased potatoes.

A liberal estimate of the cost of producing this extra 4 tons of potatoes would be £4 for the combined operations of sprouting the seed, purchasing and applying artificial manures and spraying twice.

At five centres the increase in the yield fell below 2 tons per acre, which was insufficient to meet the extra cost of production, but at the great majority of the centres the increase was sufficient to return a substantial profit.

It is possible that in a year less favourable than 1914 to the growth of the potato crop, the difference between the yield from the two plots would be even more striking.

IX.—Change of Seed Experiment.

The opinion is widely held that it is necessary to introduce a change of seed potatoes more or less frequently if the best results

are to be obtained. Numerous tests made in Great Britain, under the auspices of the Department, have shown that an increased yield may be expected from the planting of Irish or Scottish grown seed potatoes as compared with seed grown locally.

In 1913 the Department decided that this was a matter on which useful information might be collected if experiments were conducted on a uniform basis in every county in Ireland, and such tests have been made for the first time during the past season.

The experiment is designed to ascertain :—

(I.) Whether any advantage is to be gained in Ireland by introducing a change of seed potatoes, and

(II.) If so, whether the seed potatoes should be procured from Great Britain or from another part of Ireland.

In order to eliminate all factors which might affect the yield other than that with which the experiment is directly concerned, seed was obtained early in 1913 from a common source in Ulster and sent to 6 centres to be grown there for a number of years ; each season part of the produce being returned and distributed to Agricultural Instructors for the purposes of the experiment.

The centres at which the seed is being grown are as follows :—

1. Ulster—Cookstown, Co. Tyrone.
2. Munster—Clonakilty, Co. Cork.
3. Leinster—Glasnevin, Co. Dublin.
4. Connaught—Athenry, Co. Galway.
5. England—St. Ives, Huntingdonshire.
6. Scotland—Dumfries, Drumfriesshire.

In the spring of 1914 the first crop of seed was obtained from each of these 6 centres, and after being graded as uniformly as possible was distributed to the Agricultural Instructors by whom the tests were carried out. This seed had been grown only one year at each centre, for, as already explained, the original stock had been sent out by the Department in the previous year. The variety is Up-to-Date. As a basis for comparison a plot was included on which was planted the farmers' own seed of Up-to-Date.

The detailed results from each centre are published in Table IV., on pages 280-1, but for easy comparison they have been summarised in the briefest form in the following table :—

Change of Seed Experiment.—Summary of Results.

Province.	Average Total Yield per Statute Acre.													
	Farmers Home Grown Seed		Seed Grown in Ulster		Seed Grown in Munster		Seed Grown in Leinster		Seed Grown in Connaught		Seed Grown in England		Seed Grown in Scotland	
	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.
Ulster . . . (9 Centres).	14	11	13	9	12	15	13	10	13	7	12	10	13	10
Munster, . . (10 Centres).	14	14	14	7	13	13	14	1	13	19	13	9	14	9
Leinster, . . (11 Centres).	13	6	13	14	13	1	13	19	13	18	13	14	14	1
Connaught, . . (7 Centres).	11	18	13	10	13	9	14	12	14	14	15	1	14	16
Ireland, . . . (37 Centres).	**13**	**14**	**13**	**16**	**13**	**4**	**14**	**0**	**13**	**18**	**13**	**12**	**14**	**3**

It is probable that as regards (1) the need for a change of seed potatoes and (2) the merits of one district over another in producing good seed that climate is the chief determining factor. Bearing this in mind and having regard to the varying climatic conditions which prevail in different parts of Ireland, it is not advisable to confine the analysis of the results to the general average return of all the centres. Therefore, the average results obtained in each province should be studied, and it may be of assistance in interpreting the results if the order of merit of the different plots as regards average total yield be shown in the following manner:—

In Ulster.—1st, Homegrown seed; 2nd and 3rd, (equal), Leinster and Scotland; 4th, Ulster; 5th Connaught; 6th, Munster; 7th, England.

In Munster.—1st, Homegrown seed; 2nd, Scotland; 3rd, Ulster; 4th Leinster; 5th, Connaught; 6th, Munster; 7th, England.

In Leinster.—1st, Scotland; 2nd, Leinster; 3rd, Connaught; 4th and 5th (equal), Ulster and England; 6th, Homegrown seed; 7th, Munster.

In Connaught.—1st, England; 2nd, Scotland; 3rd, Connaught; 4th, Leinster; 5th, Ulster; 6th, Munster; 7th, Homegrown seed.

These are the results of the first crop of seed from the different centres, and it is not proposed at this stage of the experiment to endeavour to draw definite conclusions.

MANURIAL TEST

TABLE I.—Showing the Returns per

Centre.	Percentage of Organic Matter as shown by Department's Analysis.	Plot 1. 15 tons Farmyard Manure. Saleable.	Small	Total	Plot 2. 15 tons Farmyard Manure, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash. Saleable.	Small	Total.
		T. C.	C.	T. C.	T. C.	C.	T. C.
Donogrogue, Killimer, Co. Clare, ...	31·57	7 11	26	8 17	10 6	27	11 13
Tullagower, Killimer, Co. Clare, ...	29·21	5 13	40	7 13	7 3	34	8 17
Meenagolan, Bruckless, Co. Donegal, . . .	24·98	10 10	22	11 12	10 8	21	11 9
Drumee, Innismore, Co. Fermanagh, . . .	30·10	6 10	58	9 8	9 18	48	12 6
Clounbrane, Newtownsandes, Co. Kerry, . .	37·05	5 12	52	8 4	6 0	66	9 6
Derrindaff, Duagh, Co. Kerry, ...	33·07	6 9	24	7 13	7 6	30	8 16
Derrymullen, Robertstown, Co. Kildare, . .	31·62	5 0	64	8 4	5 6	85	9 11
Blacktrench, Naas, Co. Kildare.	40·93	3 17	106	9 3	4 3	103	9 6
Clondelara, Shannonbridge, King's County, . .	33·00	7 1	24	8 5	13 6	31	14 17
Drumsara, Kilrea, Co. Londonderry, . . .	31·90	10 0	27	11 7	12 10	24	13 14
Aghameen, Jenkinstown, Co. Louth, . . .	17·42	6 9	43	8 12	9 0	45	11 5
Carabaun, Aughamore, Co. Mayo, ...	22·08	5 0	64	8 4	6 15	68	10 3
Rossareel, Glasslough, Co. Monaghan, . . .	29·77	7 4	31	8 15	8 16	30	10 6
Clonfad, Carrick-on-Shannon, Co. Roscommon, .	20·10	4 14	24	5 18	6 19	38	8 17
Aughmagree, Kilteevan, Co Roscommon. . .	25·24	4 16	24	6 0	5 15	34	7 9
Kilnamanagh, Collooney, Co. Sligo, . . .	23·55	4 9	35	6 4	6 15	30	8 5
Derryhilla, Coalisland, Co. Tyrone, . . .	20·38	6 14	57	9 11	14 7	63	17 10
Average yield per statute acre, ...		6 6	42	8 8	8 10	46	10 16
		£	s.	d.	£	s.	d.
Cost of Manures, ...		3	0	0	5	0	6
Value of Crop, less cost of Manures: Saleable Potatoes, 2s. per cwt; Small 1s. per cwt.		11	14	0	14	5	6

ON PEATY SOILS.

Statute Acre from each Centre

Plot 3. 15 tons Farmyard Manure, ½ cwt. Sulphate of Ammonia, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.			Plot 4. 15 tons Farmyard Manure, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.			Plot 5. 1½ cwt. Sulphate of Ammonia, 6 cwt. Basic Slag, 1½ cwt. Muriate of Potash.			Plot 6. 1½ cwt. Nitrate of Soda, 6 cwt. of Basic Slag, 1½ cwt. Muriate of Potash.			Plot 7. 1½ cwt. Nitrate of Soda, 6 cwt. Superphosphate, 1½ cwt. Muriate of Potash.			Plot 8. 1½ cwt. Sulphate of Ammonia, 6 cwt. Superphosphate, 1½ cwt. Muriate of Potash.		
Saleable.	Small	Total	Saleable.	Small	Total	Saleable.	Small	Total	Saleable.	Small	Total	Saleable.	Small	Total	Saleable.	Small	Total
T. C.	C.	T. C.	T. C.	C.	T. C.	T. C.	C.	T. C.	T. C.	C.	T. C.	T. C.	C.	T. C.	T. C.	C.	T. C.
9 17	26	11 3	9 10	28	10 18	10 1	23	11 4	9 3	28	10 11	9 7	28	10 15	9 10	27	10 17
6 2	36	7 18	7 4	34	8 18	5 14	30	7 4	8 11	40	10 11	7 14	53	10 7	9 14	54	12 8
10 5	25	11 10	10 4	24	11 8	9 5	20	10 5	9 15	18	10 13	9 0	24	10 4	8 10	21	9 11
11 15	41	13 16	11 13	64	14 17	6 12	37	8 9	7 17	78	10 15	9 11	66	12 17	10 8	58	13 6
5 14	60	8 14	6 5	42	8 7	5 6	71	8 17	5 11	51	8 2	5 1	60	8 1	5 10	43	7 13
7 10	23	8 13	7 14	21	8 15	6 9	25	7 14	6 4	23	7 7	6 18	22	8 0	6 12	17	7 9
5 6	71	8 17	4 16	58	7 14	2 11	52	5 3	1 9	50	3 19	2 12	69	6 1	2 6	86	6 12
4 10	116	10 6	4 13	96	9 9	4 0	97	8 17	3 16	74	7 10	3 12	100	8 12	3 10	102	8 12
14 3	44	16 7	11 13	30	13 3	10 16	22	11 18	9 11	38	11 9	11 5	35	13 0	12 18	25	14 3
11 13	26	12 19	11 10	28	12 18	10 8	20	11 8	9 0	29	10 9	9 10	31	11 1	9 18	29	11 7
9 3	30	10 13	9 14	21	10 15	10 11	21	11 12	9 3	31	10 14	10 16	21	11 17	10 5	25	11 10
5 18	46	8 4	6 8	43	8 11	3 17	32	5 9	3 4	14	3 18	4 12	44	6 16	5 8	44	7 12
9 6	34	11 0	9 2	35	10 17	9 18	28	11 6	9 3	35	10 18	8 14	29	10 3	8 2	30	9 12
6 3	26	7 9	6 13	22	7 15	8 2	20	9 2	6 18	25	8 3	8 8	32	10 0	10 3	28	11 11
6 5	34	7 19	8 8	33	10 1	7 14	39	9 13	7 4	34	8 18	8 2	43	10 5	9 2	57	11 19
7 1	27	8 8	7 7	29	8 16	8 15	24	9 19	8 9	26	9 15	9 1	27	10 8	9 7	25	10 12
13 13	61	16 14	9 3	46	11 9	13 13	41	15 14	13 18	51	16 9	11 7	57	14 4	8 10	83	12 13
8 10	42	10 12	8 7	38	10 5	7 17	35	9 12	7 10	38	9 8	7 19	44	10 3	8 4	44	10 8
£ s. d. 4 12 9			£ s. d. 4 5 0			£ s. d. 3 0 9			£ s. d. 2 15 6			£ s. d. 2 15 6			£ s. d. 3 0 9		
14 9 3			14 7 0			14 8 3			14 2 6			15 6 6			15 11 3		

MANURIAL TEST

Table II.—Showing the Returns per

Centre.	Character of Soil.	Class of Seaweed.*	Plot 1. 15 tons Farmyard Manure. Saleable.	Small	Total.
			T. C.	C.	T. C.
Towneygorm, Inver, Co. Donegal, .	Loam, . .	Wrack, . .	9 15	21	10 16
Drumfin, Inver, Co. Donegal, . .	Do. . .	Wrack, . . .	6 15	25	8 0
Church Street, Warrenpoint, Co. Down,	Light loam . .	Wrack, . .	10 1	120	16 1
Derryogue, Kilkeel, Co. Down, .	Gravelly loam, .	Wrack, . .	12 12	83	16 15
Loughgeorge, Claregalway, Co. Galway,	Loam, . .	Wrack, . .	5 4	57	8 1
Doonferris, Ballybunion, Co. Kerry, .	Peaty loam,	Drift Weed and Wrack	12 4	53	14 17
Kilmore, Ballyduff, Co. Kerry, . .	Deep gravelly loam	Drift Weed and Wrack	8 7	13	9 0
Mullaharna, Aghameen, Co. Louth, .	Moory loam, .	Wrack, . .	8 18	27	10 5
Killerduff, Ballycastle, Co. Mayo, .	Clay, . . .	Drift Weed, .	6 6	60	9 6
Kilsallagh, Westport, Co. Mayo, .	Sandy loam, .	Wrack, . .	7 15	35	9 10
Kilrush, Dungarvan, Co. Waterford, .	Medium loam, .	Wrack, . .	10 0	57	12 17
Templetown, Fethard, Co. Wexford, .	Sandy, . .	Wrack, . .	3 0	10	3 10
Do. do. do. .	Do. . . .	Wrack, . .	3 9	16	4 5
Average yield per Statue Acre, ...			8 0	45	1
Cost of Manures, ...			£ 3	s. 0	d. 0
Value of Crop less cost of Manures; Saleable Potatoes, 2s. per cwt.; Small, 1s. per cwt.			18	5	0

*Wrack consists chiefly of different varieties of *Fucus* and allied genera, which grow between which are washed up from below low

WITH SEAWEED.

Statute Acre from each Centre.

Plot 2. 15 tons Seaweed.			Plot 3. 15 tons Seaweed, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.			Plot 4. 15 tons Seaweed, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.			Plot 5. 15 tons Seaweed, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate.			Plot 6. 15 tons Seaweed, 4 cwt. Superphosphate.		
Saleable.	Small	Total.	Saleable.	Small	Total.	Saleable.	Small	Total.	Saleable.	Small	Total.	Saleable.	Small	Total.
T. C.	C.	T. C.	T. C.	C.	T. C.	T. C.	C.	T. C.	T. C.	C.	T. C.	T. C.	C.	T. C.
10 10	20	11 10	13 0	25	14 5	11 10	25	12 15	12 15	27	14 2	11 12	20	12 12
7 18	30	9 8	11 16	31	13 7	9 18	28	11 6	11 15	29	13 4	9 15	31	11 6
7 13	90	12 3	14 1	58	16 19	11 19	77	15 16	13 12	49	16 1	11 12	92	16 4
9 5	60	12 5	14 16	37	16 13	12 2	50	14 12	14 1	47	16 8	11 7	58	14 5
6 4	42	8 6	7 18	41	9 19	6 12	43	8 15	7 8	38	9 6	6 14	41	8 15
12 17	39	14 16	12 16	53	15 9	12 10	59	15 9	13 1	41	15 2	13 5	43	15 8
11 6	13	11 19	13 19	20	14 19	12 19	29	14 8	14 3	22	15 5	13 18	24	15 2
9 16	32	11 8	11 10	28	12 18	11 0	36	12 16	10 8	28	11 16	10 3	23	11 6
5 2	68	8 10	6 16	68	10 4	6 8	52	9 0	6 16	66	10 2	5 16	58	8 14
6 15	30	8 5	8 10	35	10 5	7 5	33	8 18	8 0	32	9 12	7 0	30	8 10
5 3	42	7 5	9 5	62	12 7	9 7	56	12 3	8 6	52	10 18	8 5	56	11 1
3 8	16	4 4	4 18	16	5 14	4 3	13	4 16	4 17	18	5 15	4 1	12	4 13
3 12	18	4 10	4 16	21	5 17	4 1	15	4 16	4 16	16	5 12	4 2	16	4 18
7 13	38	9 11	10 6	38	12 4	9 4	40	11 4	10 0	36	11 16	9 1	39	11 0
£ s. d. 2 5 0			£ s. d. 4 5 6			£ s. d. 3 10 0			£ s. d. 3 14 6			£ s. d. 2 19 0		
14 19 0			18 4 6			16 18 0			18 1 6			17 2 0		

high and low water marks. Drift Weed consists chiefly of different varieties of *Laminaria*, water mark by tides and storms.

TABLE III.—Showing the Returns per

Centre.	Variety of Potato.
Carralbane, Glenarm, Co. Antrim,	Up-to-Date,
Copsetown Abbey, Mallow, Co. Cork,	Langworthy,
Dromore, Letterkenny, Co. Donegal,	Irish Queen
Beaufort, Killarney, Co. Kerry,	Champion,
Brandonwell, Ardfert, do.,	Beauty of Bute,
Belan, Moone, Co. Kildare,	Up-to-Date,
Do. Do. do.,	Scottish Triumph,
Lughill, Monasterevan, Co. Kildare,	Up-to-Date,
Bennettsbridge, Co. Kilkenny,	Irish Queen,
Castlehinch, do.,	Champion
Cappagh, Inistioge, Co. Kilkenny,	Irish Queen
Higginstown, do.,	Irish Queen,
Killaree, Three Castles, do.	Champion,
Raheenduff, Cuffesgrange, Co. Kilkenny,	Champion,
Do., do., do.,	Up-to-Date,
Kilrush, Freshford, do.,	British Queen,
Freshford, do.,	Irish Queen,
Kilree, Stoneyford, do.,	Up-to-Date,
Kilmanagh, do.,	Champion,
Philipstown, King's Co.,	Up-to-Date,
Roscrea, do.,	Greggor Cup,
Athlacca, Co. Limerick,	British Queen,
Kilmallock, do.	Champion,
Castlebar, Co. Mayo,	Irish Queen,
Ballinasloe, Co. Roscommon,	Duchess of Cornwall,
Cloneyharp, Co. Tipperary, S.R.,	Champion,
Clonoulty, do.,	Champion,
Augher, Co. Tyrone,	Skerry Flounder,
Coalisland, do.,	Up-to-Date,
Cappoquin, Co. Waterford,	Irish Queen,
Killucan, Co. Westmeath,	British Queen,
Average yield per statute acre (31 centres),	–
Average Increase in yield due to improved methods,	–

TEST.

Statute Acre from each Centre.

Plot I. Seed planted whole directly from pit; 20 tons dung only applied; crop left unsprayed.								Plot II. Seed sprouted; 20 tons dung and 6 cwt. standard mixture of artificials for Potatoes, applied; crop sprayed twice.								Total Gain in Yield due to Cultivation, &c.	
Saleable.		Small.		Diseased.		Total.		Saleable.		Small.		Diseased.		Total.			
T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.
14	3	1	7	—		15	10	19	0	2	3	—		21	4	5	14
3	8	0	15	0	3	4	6	10	3	0	13	—		10	16	6	10
7	0	0	10	0	3	7	13	9	0	0	11	0	2	9	13	2	0
5	5	2	0	—		7	5	10	17	1	18	—		12	15	5	10
12	12	1	0	—		13	12	14	4	1	2	—		15	6	1	14
6	13	1	18	0	5	8	16	9	0	1	11	0	5	10	16	2	0
6	13	1	8	0	2	8	3	11	0	1	4	0	1	12	5	4	2
8	0	0	17	0	10	9	7	11	16	1	6	1	6	14	8	5	1
6	17	1	0	0	3	8	0	9	4	1	1	—		10	5	2	5
3	7	1	10	1	9	6	6	6	3	1	14	0	9	8	6	2	0
4	10	0	7	0	3	5	0	9	9	0	6	0	3	9	18	4	18
6	6	0	15	—		7	1	11	1	0	17	—		11	18	4	17
4	0	1	10	0	7	5	17	6	3	2	0	0	2	8	5	2	8
4	19	2	17	0	19	8	15	9	11	2	3	0	2	11	16	3	1
9	7	1	9	0	5	11	1	13	17	1	7	—		15	4	4	3
7	4	2	3	—		9	7	12	3	1	6	—		13	9	4	2
10	2	1	3	—		11	5	10	0	1	6	—		11	6	0	1
6	9	2	7	0	1	8	17	9	17	1	0	0	3	11	0	2	3
4	12	1	4	1	2	6	18	8	6	2	7	1	8	12	1	5	3
10	17	1	7	—		12	4	15	5	0	12	—		15	17	3	13
4	13	0	6	—		4	19	11	13	1	3	—		12	16	7	17
5	8	0	15	0	5	6	8	7	6	0	16	0	4	8	6	1	18
9	0	0	13	0	7	10	0	9	5	1	4	0	8	10	17	0	17
6	6	1	8	0	10	8	4	9	3	1	3	—		10	6	2	2
7	15	2	13	—		10	8	13	8	4	13	—		18	1	7	13
4	6	1	13	1	16	7	15	8	11	1	12	0	17	11	0	3	5
4	17	1	15	1	17	8	9	8	19	1	0	0	7	10	6	1	17
5	8	1	0	0	5	6	13	12	5	2	0	0	6	14	11	7	18
4	17	1	15	3	5	9	17	14	0	2	3	1	3	17	6	7	19
4	4	0	13	—		4	17	9	4	0	13	—		9	17	5	0
8	16	1	2	1	0	10	18	15	8	1	15	0	6	17	9	6	11
6	**14**	**1**	**7**	**0**	**9**	**8**	**10**	**10**	**16**	**1**	**9**	**0**	**5**	**12**	**10**	**4**	**0**
–		–		–		–		**4**	**2**	**0**	**2**	**0**	**4** decrease	**4**	**0**	**4**	**0**

CHANGE OF SEED

TABLE IV.—Showing the Returns per

Province and County.	Character of Soil.	Farmers' Home Grown Seed.				Seed Grown in Ulster.				Seed Grown in Munster.			
		Sale-able.	Small	Dis-eased	Total	Sale-able.	Small	Dis-eased	Total	Sale-able.	Small	Dis-eased	Total
		T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
Antrim, . . .	Light Loam, .	15 10	1 7	—	16 17	13 12	1 13	—	15 5	13 7	1 13	—	15 0
Cavan, . . .	Loam, . .	4 7	0 14	0 13	5 14	4 5	0 14	0 13	5 12	4 5	0 18	0 16	5 19
Donegal, . . .	Loam, . .	14 8	1 17	0 10	16 15	13 7	2 0	0 13	16 0	11 6	1 16	0 15	13 17
Down, . . .	Clay Loam, .	10 12	1 16	1 0	13 8	9 8	1 0	0 9	10 17	8 10	1 0	0 9	9 19
Down, . . .	Loam, . .	11 5	2 11	1 0	14 16	10 17	2 11	1 0	14 8	10 17	2 10	1 2	14 9
Fermanagh, . .	Strong Loam, .	15 3	2 17	—	18 0	14 16	2 17	—	17 13	13 11	2 19	—	16 10
Londonderry, . .	Medium Loam, .	15 0	1 1	0 11	16 12	11 15	1 11	0 12	13 18	11 6	1 19	0 11	13 16
Monaghan, . .	Medium Clay Loam, .	7 19	1 15	1 10	11 4	8 1	1 12	1 3	10 16	7 10	1 6	1 5	10 1
Tyrone, . . .	Black Loam, .	14 9	2 11	0 14	17 14	13 12	2 6	1 2	17 0	10 11	2 17	1 17	15 5
Average for Ulster	**(9 Centres), .**	**12 1**	**1 17**	**0 13**	**14 11**	**11 1**	**1 16**	**0 12**	**13 9**	**10 3**	**1 17**	**0 15**	**12 15**
Cork, . . .	Medium Loam, .	11 14	0 16	1 0	13 10	10 14	0 10	2 10	13 14	8 4	0 7	2 9	11 0
Cork, . . .	Limestone Loam	15 5	0 13	0 1	15 19	12 6	0 15	0 2	13 3	12 15	0 18	0 2	13 15
Cork, . . .	Medium Loam, .	17 10	0 18	2 6	20 14	13 7	1 5	4 8	19 0	10 13	1 0	3 11	15 4
Kerry, . . .	Deep Gravelly Loam,	13 12	0 16	—	14 8	14 3	0 6	—	14 9	16 8	1 16	—	18 4
Kerry, . . .	Medium Loam, .	12 6	2 18	—	15 4	14 8	3 16	—	18 4	14 2	2 0	—	16 2
Limerick, . . .	Clay, . .	11 0	1 3	0 3	12 6	10 12	2 6	0 5	13 3	9 5	3 0	0 6	12 11
Limerick, . . .	Limestone Loam	16 11	1 17	—	18 8	15 3	1 14	—	16 17	13 14	2 11	—	16 5
Tipperary (N.R.), .	Clay Loam, .	7 14	1 8	0 9	9 11	6 6	0 16	0 16	7 18	7 3	1 6	0 8	8 17
Tipperary (S.R.), .	Limestone, .	13 7	1 1	0 4	14 12	12 16	1 3	0 3	14 2	12 4	0 11	0 4	12 19
Waterford, . .	Loam, . .	11 6	0 14	0 9	12 9	11 13	0 17	0 13	13 3	10 3	0 16	0 15	11 14
Average for Munster	**(10 Centres), .**	**13 1**	**1 4**	**0 9**	**14 14**	**12 3**	**1 7**	**0 17**	**14 7**	**11 9**	**1 9**	**0 15**	**13 13**
Carlow, . . .	Clay Loam, .	9 9	0 14	—	10 3	8 11	0 19	0 10	10 0	7 14	0 17	—	8 11
Kildare, . . .	Strong Loam, .	14 14	1 1	0 8	16 3	17 15	1 5	1 0	20 0	16 10	1 0	0 16	18 6
Kilkenny, . .	Light Loam, .	6 12	2 8	—	9 0	11 5	2 1	—	13 6	9 17	1 19	—	11 16
Kilkenny, . .	Loam, . .	8 0	1 9	2 0	11 9	11 0	1 9	2 0	14 9	8 17	1 14	2 0	12 11
King's, . . .	Stiff Clay, .	14 14	0 12	0 10	15 16	12 5	0 14	0 8	13 7	11 13	1 4	2 0	14 17
Louth, . . .	Sandy Loam, .	12 5	1 11	—	13 16	9 17	2 16	—	12 13	10 9	2 5	—	12 14
Meath, . . .	Gravelly Loam, .	12 5	0 18	1 2	14 5	11 18	1 2	0 18	13 18	11 13	1 5	0 19	13 17
Queen's, . . .	Clay Loam, .	12 5	1 12	0 14	14 11	11 8	1 16	0 2	13 6	10 12	1 11	0 4	12 7
Westmeath, . .	Medium Loam, .	12 11	0 7	0 3	13 1	12 17	0 8	0 6	13 11	10 14	0 13	0 11	11 18
Wexford, . . .	Shingly Loam, .	13 18	1 8	—	15 6	12 12	1 5	—	13 17	12 6	1 4	—	13 10
Wicklow, . . .	Light Loam, .	8 4	2 14	1 18	12 16	9 0	2 4	1 2	12 6	8 6	3 2	1 11	12 19
Average for Leinster	**(11 Centres), ..**	**11 7**	**1 7**	**0 12**	**13 6**	**11 14**	**1 9**	**0 11**	**13 14**	**10 16**	**1 10**	**0 15**	**13 1**
Galway, . . .	Loam, . .	10 18	2 3	0 7	13 8	10 2	3 9	0 5	13 16	10 15	2 11	0 8	13 14
Leitrim, . . .	Clay Loam, .	11 12	0 18	1 4	13 14	11 17	0 18	1 8	14 3	11 4	0 19	1 7	13 10
Mayo, . . .	Light Loam, .	15 3	1 10	0 16	17 9	14 2	1 4	0 16	16 2	13 5	1 7	0 13	15 5
Mayo, . . .	Strong Clay, .	8 0	2 0	—	10 0	10 0	1 8	—	11 8	8 19	1 8	0 1	10 8
Roscommon, . .	Medium Loam, .	5 18	0 18	—	6 16	9 4	3 6	—	12 10	9 0	3 4	—	12 4
Roscommon, . .	Limestone Clay,	15 18	1 10	—	17 8	11 15	1 9	—	13 4	11 16	1 13	—	13 9
Sligo, . . .	Medium Loam, .	12 16	1 9	0 3	14 8	11 5	1 17	0 8	13 10	13 18	1 9	0 4	15 11
Average for Connaught (7 Centres),		**10 1**	**1 10**	**0 7**	**11 18**	**11 3**	**1 19**	**0 8**	**13 10**	**11 5**	**1 16**	**0 8**	**13 9**
Average for Ireland (37 Centres),		**11 15**	**1 9**	**0 10**	**13 14**	**11 11**	**1 12**	**0 13**	**13 16**	**10 18**	**1 12**	**0 14**	**13 4**

EXPERIMENT.

Statute Acre from each Centre.

Seed Grown in Le nster.				Seed Grown in Connaught.				Seed Grown in England.				Seed Grown in Scotland.			
Saleable.	Small.	Diseased.	Total.	Saleable.	Small.	Diseased.	Total.	Saleable.	Small.	Diseased.	Total.	Saleable.	Small	Diseased.	Total.
T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
11 14	2 14	—	14 8	11 19	2 4	—	14 3	11 3	3 11	—	14 14	13 12	1 18	—	15 10
4 3	0 17	0 15	5 15	4 10	1 0	1 0	6 10	4 0	0 14	0 12	5 6	4 11	1 1	0 18	6 10
11 11	1 14	0 16	14 1	11 10	1 10	0 14	13 14	10 12	1 3	1 6	13 1	13 10	0 13	0 18	15 1
9 10	1 10	0 13	11 13	9 4	1 8	0 11	11 3	7 14	1 9	0 14	9 17	9 0	1 7	0 9	10 16
10 6	3 2	1 10	14 18	11 9	2 15	1 7	15 11	9 19	2 15	1 5	13 19	10 5	2 18	1 4	14 7
15 7	1 19	—	17 6	14 11	2 15	—	17 6	12 14	3 0	—	15 14	14 11	2 1	—	16 12
13 16	1 16	0 8	16 0	12 3	1 15	0 10	14 8	11 15	2 0	0 15	14 10	13 13	1 7	0 14	15 14
7 18	1 3	1 8	10 9	8 6	1 8	1 0	10 14	5 9	1 17	1 7	8 13	7 15	1 14	1 5	10 14
13 14	2 0	1 6	17 0	13 6	2 10	1 2	16 18	12 3	2 11	2 6	17 0	13 6	1 18	1 0	16 4
10 18	**1 17**	**0 15**	**13 10**	**10 15**	**1 18**	**0 14**	**13 7**	**9 10**	**2 2**	**0 18**	**12 10**	**11 3**	**1 13**	**0 14**	**13 10**
11 7	0 11	1 17	13 15	13 1	0 16	0 18	14 15	11 11	1 0	0 14	13 5	12 9	0 11	1 8	14 8
9 4	1 5	0 3	10 12	10 17	0 19	0 2	11 18	14 3	0 11	0 1	14 15	12 10	0 14	—	13 4
12 18	0 17	2 15	16 10	13 4	1 2	3 13	17 19	12 18	1 4	3 18	18 0	13 6	1 8	2 19	17 13
15 11	1 13	—	17 4	14 12	1 10	—	16 2	14 5	1 6	—	15 11	16 13	1 8	—	18 1
12 0	3 0	—	15 0	14 8	2 2	—	16 10	11 16	3 2	—	14 18	14 14	2 6	—	17 0
11 0	3 12	0 8	15 0	7 6	3 0	0 14	11 0	9 6	1 10	0 4	11 0	10 0	2 0	0 6	12 6
16 5	1 8	—	17 13	16 0	2 0	—	18 0	12 17	3 3	—	16 0	15 9	1 14	—	17 3
7 14	1 10	0 10	9 14	6 6	1 9	0 11	8 6	6 6	1 4	1 2	8 12	7 9	1 3	0 11	9 3
11 3	1 0	0 4	12 7	11 6	0 12	0 4	12 2	9 6	1 6	0 8	11 0	13 6	0 17	0 4	14 7
10 16	1 3	0 17	12 16	11 13	0 15	0 10	12 18	10 17	0 6	0 12	11 15	10 9	0 9	0 6	11 4
11 16	**1 12**	**0 13**	**14 1**	**11 17**	**1 9**	**0 13**	**13 19**	**11 6**	**1 9**	**0 14**	**13 9**	**12 13**	**1 5**	**0 11**	**14 9**
9 9	1 1	0 8	10 18	8 0	0 12	0 11	9 3	8 6	0 17	0 17	10 0	8 12	0 17	0 11	10 0
16 10	2 2	0 16	19 8	18 0	3 18	0 16	22 14	15 8	3 0	0 8	18 16	16 18	1 2	1 5	19 5
9 15	2 3	—	11 18	12 2	1 14	—	13 16	11 0	1 9	—	12 9	10 0	1 11	—	11 11
11 0	1 9	2 0	14 9	10 3	1 9	2 6	13 18	10 1	1 9	2 6	13 16	10 4	1 9	2 6	13 19
12 18	0 14	4 11	18 3	10 16	0 10	5 8	16 14	10 0	0 16	7 18	18 14	13 6	1 4	1 13	16 3
10 12	2 8	—	13 0	11 8	2 12	—	14 0	8 16	3 3	—	11 19	10 15	2 4	—	12 19
12 0	1 0	1 1	14 1	13 2	1 3	0 16	15 1	11 3	1 9	1 5	13 17	12 3	1 2	0 15	14 0
12 0	1 12	0 3	13 15	10 7	1 14	0 4	12 5	11 10	1 12	0 3	13 5	12 6	1 5	0 5	13 16
9 10	0 11	0 13	10 14	10 4	0 11	0 10	11 5	12 18	0 8	0 10	13 16	14 7	0 14	0 4	15 5
10 16	1 6	—	12 2	11 10	1 10	—	13 0	11 18	1 8	—	13 6	12 6	1 7	—	13 13
9 9	3 14	1 17	15 0	7 3	2 15	1 8	11 6	8 0	2 1	1 1	11 2	9 18	2 15	1 7	14 0
11 5	**1 13**	**1 1**	**13 19**	**11 3**	**1 13**	**1 2**	**13 18**	**10 16**	**1 12**	**1 6**	**13 14**	**11 18**	**1 8**	**0 15**	**14 1**
8 18	4 3	0 11	13 12	9 9	2 14	0 6	12 9	9 7	2 13	0 7	12 7	8 18	2 16	0 6	12 0
12 13	1 4	1 10	15 7	12 7	1 2	1 7	14 16	12 10	0 19	1 8	14 17	12 9	0 16	1 3	13 8
16 4	1 8	0 16	18 8	16 12	1 5	0 14	18 11	16 3	2 3	0 16	19 2	17 5	1 9	0 12	19 6
9 16	1 14	0 5	11 15	9 5	1 8	0 8	11 1	9 19	1 3	0 5	11 7	9 11	1 3	0 6	11 0
9 3	3 15	—	12 18	10 3	3 18	—	14 1	8 16	4 15	—	13 11	9 10	3 14	—	13 4
13 17	1 8	—	15 5	14 10	1 11	—	16 1	14 18	1 13	—	16 11	15 3	1 12	—	16 15
13 5	2 0	0 5	15 10	13 16	2 1	0 3	16 0	15 0	2 2	0 7	17 9	15 1	1 16	0 4	17 1
11 17	**2 5**	**0 10**	**14 12**	**12 6**	**2 0**	**0 8**	**14 14**	**12 8**	**2 4**	**0 9**	**15 1**	**12 11**	**1 18**	**0 7**	**14 16**
11 9	**1 16**	**0 15**	**14 0**	**11 9**	**1 14**	**0 15**	**13 18**	**10 18**	**1 16**	**0 18**	**13 12**	**12 1**	**1 10**	**0 12**	**14 3**

IV.—MANGELS.

A.—Manurial Test (Old Series).

The object of this series of experiments was to discover a s mple and profitable method of manuring the mangel crop. The tests commenced in 1901, and were repeated each year until 1911, when the series was concluded. During the period indicated the experiments were carried out :—

(*a*) At 188 centres distributed over the whole country.
(*b*) On a great diversity of soils.
(*c*) With the principal varieties of mangels.
(*d*) During seasons differing widely in character.

It may be claimed, therefore, that the figures obtained from experimental work of this scope—probably without a parallel—show, in the most convincing manner, the results that may generally be expected from the application to the mangel crop of the various manurial dressings included in the experiments under review.

It is obviously impossible in framing reports on experimental work of this magnitude to show the returns from individual centre in an easily readable form, nor does a careful analysis of the figures returned each year indicate that any very useful purpose would be served thereby. The results on different kinds of soil or in varying seasons have been remarkably uniform throughout and the general summaries set forth in Tables I. and II. give an accurate idea of the effects of the different manurial dressings under most of the conditions likely to be met with in the growing of mangels in this country.

Detailed results of the Old Series of experiments have been given in the D partment's reports on Mangel Experiments for each of the years 1901 to 1909. Further, it has been the custom for each County Agricultural Committee to publish, annually, detailed accounts of these experiments as carried out in their county. Thus farmers have always been enabled to peruse the general report for the whole country and also the results of tests made in their own county.

It is necessary to state that, when the experiments had been

carried out for the five years, 1901 to 1905, it was deemed advisable to modify slightly the original plan of the tests by increasing the amounts of some of the manures employed. Accordingly, in 1906, the following changes were introduced :—

(1) Farmyard manure was applied throughout at the rate of 20 tons instead of 15 tons per statute acre.

(2) Kainit was applied to Plot 5 at the rate of 4 cwt. instead of 2 cwt. per statute acre.

(3) An extra plot, No. 7, was included with the object of showing the effect of supplying the nitrogenous manure in the form of nitrate of soda applied in two top dressings, as compared with the use of sulphate of ammonia sown in the drills.

These slight modifications in no way prejudiced the original object of the experiments, but in order that the figures for each period may be strictly comparable, the summaries are shown separately in the following Tables :—

TABLE I.—Showing the General Average Results of 61 Experiments carried out during the five years, 1901-5.

Year.	Number of Experiments.	PLOT 1. No Manure.	PLOT 2. 15 tons Farmyard Manure.	PLOT 3. 15 tons Farmyard Manure, 4 cwt. Superphosphate.	PLOT 4. 15 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia.	PLOT 5. 15 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia, 2 cwt. Kainit.	PLOT 6. 15 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Salt.
		Average yield per statute acre					
		T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
1901 . .	6	15 8	26 11	27 13	31 0	33 11	36 11
1902 . .	12	7 1	18 0	19 7	22 11	24 18	25 12
1903 . .	11	3 3	16 5	17 13	23 12	24 6	25 10
1904 . .	21	8 8	22 3	25 3	27 7	29 17	31 18
1905 . .	11	3 14	16 13	19 8	21 3	23 13	24 10
Average yield . .		*7 6	19 14	21 17	24 19	27 2	28 13
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Average Cost of Manures .		—	3 0 0	3 12 4	4 17 2	5 2 2	5 1 2
Value of Crop less Cost of Manures (Mangels at 10s per ton) . . .		3 13 0	6 17 0	7 6 2	7 12 4	8 8 10	9 5 4

* Average of 56 Centres only.

Table II.—Showing the General Average Results of 127 Experiments carried out during the six years, 1906–1911.

Year.	No. of Experiments.	Plot 1. No Manure.		Plot 2. 20 tons Farmyard Manure.		Plot 3. 20 tons Farmyard Manure, 4 cwt. Superphosphate.		Plot 4. 20 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia.		Plot 5. 20 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Kainit.		Plot 6. 20 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Salt.		Plot 7. 20 tons Farmyard Manure, 4 cwt. Superphosphate, 4 cwt. Salt, 2 cwt. Nitrate of Soda (applied after thinning in two dressings).	
						Average yield per statute acre									
		T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.
1906 .	26	9	7	24	19	27	2	29	5	32	1	34	7	34	14
1907 .	35	10	18	25	15	26	17	29	15	32	15	34	5	32	19
1908 .	24	8	11	26	7	27	5	31	2	33	10	34	13	34	8
1909 .	14	7	16	24	4	25	11	27	19	30	5	30	16	30	15
1910 .	19	9	11	23	11	26	8	29	19	32	9	33	12	31	16
1911 .	9	8	14	24	2	26	5	30	12	34	4	35	10	36	3
Average Yield .		9	9	25	2	26	15	29	16	32	12	33	19	33	8
Average Cost of Manures . .		£ s. d. —		£ s. d. 4 0 0		£ s. d. 4 12 4		£ s. d. 6 1 8		£ s. d. 6 12 8		£ s. d. 6 7 8		£ s. d. 6 2 8	
Value of Crop less cost of Manures (Mangels at 10s. per ton) .		4 14 6		8 11 0		8 15 2		8 16 4		9 12 10		10 11 10		10 11 4	

The effects of the various manurial dressings as indicated in the above Tables may be epitomised briefly as follows:—

(1) Comparing the returns from Plot 2 for each period, it is seen that a dressing of 20 tons of farmyard manure was more profitable than a dressing of 15 tons per statute acre.

(2) The application of 4 cwt. superphosphate on Plot 3 resulted in an average profit of 6*s.* 6*d.* per annum for the entire period.

(3) The addition of 2 cwt. sulphate of ammonia on Plot 4 resulted in an average annual profit of 3*s.* 6*d.* for the entire period.

(4) As regards the application of kainit on Plot 5, a dressing of 2 cwt. during the first period and of 4 cwt. during the second period gave identical results, viz., a profit of 16*s.* 6*d.* per statute acre.

(5) The application of 4 cwts. salt on Plot 6 gave an average annual return, in excess of Plot 4 (dressed with superphosphate and sulphate of ammonia) of £1 13*s*. and £1 15*s*. 6*d*. during the first and second periods, respectively.

(6) Two top dressings of 1 cwt. each of nitrate of soda on Plot 7 produced practically the same results as a similar quantity of sulphate of ammonia applied in the drills on Plot 6.

The results of these experiments, and also those obtained from the New Series, the results of which are given in the following pages fully justify the advice given in previous reports, viz., that a thoroughly reliable manurial dressing for the mangel crop, which may be confidently expected to give a profitable return, consists of a liberal quantity of farmyard manure in conjunction with—

4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Salt,	per Statute Acre.

In case the crop is backward in growth or attacked by insect pests, a top dressing of 1 cwt. nitrate of soda after the mangels are thinned is recommended.

B.—Manurial Test (New Series).

After the old series of manurial experiments had been carried out for a few years, the results indicated that, in addition to a good dressing of dung, a suitable mixture of artificial manures for the mangel crop was composed of:—4 cwt. superphosphate, 2 cwt. sulphate of ammonia, and 4 cwt. salt.

With a view to ascertaining whether the quantity of any of these three ingredients could, with advantage, be increased or reduced, a new series of experiments was devised in 1908. Each plot received a fixed quantity of farmyard manure, together with a mixture of artificial manures, in which the three ingredients were applied in varying quantities.

In 1914 this experiment was carried out on 34 farms in 17 counties.

For the sake of easy reference and comparison, the general average results for 1914 and the six previous years are briefly summarised in the following Tables:—

Varying quantities of Superphosphate.

Plot.	Manures applied per Statute Acre.	1914. (34 Centres.) Average yield per Statute Acre.		1914. (34 Centres.) Value of Crop after deducting cost of Manures.			Average for six years, 1908-13. (157 Centres.) Average yield per Statute Acre.		Average for six years, 1908-13. (157 Centres.) Value of Crop after deducting cost of Manures.		
		T.	C.	£	s.	d.	T.	C.	£	s.	d.
2	3 cwt. Superphosphate with Dung, Sulphate of Ammonia and Salt, .	38	0	12	12	6	31	15	9	11	11
3	4 cwt. Superphosphate, do., .	39	5	13	1	6	33	3	10	3	2
4	5 cwt. Superphosphate, do., .	39	12	13	1	6	33	7	10	1	7

Varying quantities of Sulphate of Ammonia.

Plot.	Manures applied per Statute Acre.	1914. (34 Centres.) Average yield per Statute Acre.		1914. (34 Centres.) Value of Crop after deducting cost of Manures.			Average for six years, 1908-13. (157 Centres.) Average yield per Statute Acre.		Average for six years, 1908-13. (157 Centres.) Value of Crop after deducting cost of Manures.		
		T.	C.	£	s.	d.	T.	C.	£	s.	d.
5	1 cwt. Sulphate of Ammonia, with Dung, Superphosphate and Salt, . .	38	17	13	13	0	31	18	10	4	10
3	2 cwt. Sulphate of Ammonia, do.,	39	5	13	1	6	33	3	10	3	2
6	3 cwt. Sulphate of Ammonia, do.,	41	7	13	7	0	34	12	10	2	7

Varying quantities of Salt.

Plot.	Manures applied per Statute Acre.	1914. (34 Centres.) Average yield per Statute Acre		1914. (34 Centres.) Value of Crop after deducting cost of Manures.			Average for six years, 1908-13. (157 Centres.) Average yield per Statute Acre.		Average for six years, 1908-13. (157 Centres.) Value of Crop after deducting cost of Manures.		
		T.	C.	£	s.	d.	T.	C.	£	s.	d.
7	2 cwt. Salt, with Dung, Superphosphate and Sulphate of Ammonia, . .	38	4	12	14	0	31	8	9	8	2
3	4 cwt. Salt, do., .	39	5	13	1	6	33	3	10	3	2
8	6 cwt. Salt, do., .	41	5	13	18	6	33	6	10	1	1

Since 1912 an extra plot, No. 9, has been included in the experiments with the object of showing the effects of the application of three-quarters of the amount of the standard dressing of artificials applied on Plot 8.

The following Table shows the returns obtained from dung alone, dung and three-quarters of the standard dressing of artificials, and dung with the full quantity of the standard dressing, respectively:—

Varying quantities of the Standard Mixture.

Plot.	Manures applied per Statute Acre.	1914. (34 Centres.) Average yield per Statute Acre.		1914. (34 Centres.) Value of Crop after deducting cost of Manures.			Average for two years 1912–13. (44 Centres.) Average yield per Statute Acre.		Average for two years 1912–13. (44 Centres.) Value of Crop after deducting cost of Manures.		
		T.	C.	£	s.	d.	T.	C.	£	s.	d.
1	20 tons Dung, . .	29	0	10	10	0	20	8	6	4	0
9	20 tons Dung, 7½ cwt. Standard Mixture of Artificials (¾ dressing) . . .	37	4	12	13	9	26	18	7	9	9
3	20 tons Dung, 10 cwt. Standard Mixture of Artificials (Full dressing), . .	39	5	13	1	6	29	18	8	8	0

The most important points brought out by the foregoing results obtained under the conditions observed in carrying out these experiments are :—

(*a*) That the most generally satisfactory dressing of superphosphate is 4 cwt. per statute acre. Three cwt. seems scarcely sufficient to meet the full requirements of the crop, whilst 5 cwt, is apparently more than sufficient in most cases.

(*b*) That, after deducting the cost of the manures, there is, on the average, very little difference in the value of the crop from each of the three plots manured with sulphate of ammonia at the rate of 1 cwt., 2 cwt., and 3 cwt., respectively.

The inference to be drawn from these results is that whilst a profit may be obtained from an application of as much as 3 cwt. sulphate of ammonia, it is doubtful whether so large an outlay is desirable. A dressing of from 1 to 2 cwt. is calculated to give more uniformly satisfactory results under average conditions.

(*c*) That 4 cwt. of salt is more generally suitable than either 2 cwt. or 6 cwt. per statute acre. Thus, each season the returns from 4 cwt. of salt have been markedly better than those from 2 cwt. In the dry seasons of 1911, 1913, and 1914, the results were in favour of the heavy dressing of salt; which may be due to the fact that salt retains moisture and keeps the soil damp.

(*d*) That, as a rule, greater profit is obtained from the full quantity of the standard mixture of artificials than from a smaller dressing of the same mixture.

The results of this series of experiments do not indicate the necessity for any modification of the recommendations given on pages 285 regarding the application of artificial manures to the mangel crop.

III.—Manurial Tests on Peaty Soils.

The objects of this experiment are—

1. To ascertain whether in the case of pronounced peaty soils any advantage is to be gained by reducing the quantity of sulphate of ammonia or of omitting it entirely from the standard mixture of artificial manures when applied in conjunction with dung, and

2. To compare the results obtained from artificials alone with farmyard manure and artificials applied together.

An experiment on somewhat similar lines was carried out at seven centres in 1913, and the results were published in the report for last year, but the test was extended in 1914, and plots Nos. 6 and 7, manured with artificials alone, were included. During the past season the experiment was carried out at 6 centres in 4 counties.

The detailed results obtained at each centre are given in the following Table :—

Centre.	Percentage of Organic Matter.	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 5.	Plot 6.	Plot 7.
		20 tons Farmyard Manure.	20 tons Farmyard Manure, 4 cwt. Superphosphate, 4 cwt. Kainit.	20 tons Farmyard Manure, 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 4 cwt. Kainit.	20 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Kainit.	20 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Salt.	4 cwt. Superphosphate, 2 cwt. Nitrate of Soda, 4 cwt. Kainit.	4 cwt. Superphosphate 2 cwt Nitrate of Soda, 4 cwt. Salt.
		T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
Millstreet Co. Cork .	17·88	24 17	30 19	37 1	40 11	37 11	39 19	43 14
Lixnaw, Co. Kerry .	21·10	21 19	29 12	29 15	33 7	32 12	29 17	26 18
Newtownsandes, Co. Kerry	37·05	35 0	41 19	45 12	46 0	43 14	35 8	33 16
Banagher, King's Co.	48·75	20 10	26 11	29 7	27 7	30 10	27 14	31 15
Cloncarban, Birr, King's County	48·20	20 11	25 7	27 12	30 13	31 11	22 10	23 7
Ardgallagher, Co. Roscommon	32·55	33 2	42 12	46 13	46 19	45 16	48 5	43 18
Average yield per statute acre, . . .		**26 0**	**32 17**	**36 0**	**37 9**	**36 19**	**33 19**	**33 18**
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cost of Manures, . .		**4 0 0**	**5 6 0**	**6 1 6**	**6 17 0**	**6 11 0**	**2 10 0**	**2 4 0**
Value of Crop, less cost of Manures (Mangels at 10s. per ton), . .		**9 0 0**	**11 2 6**	**11 18 6**	**11 17 6**	**11 18 6**	**14 9 6**	**14 15 0**

In the above estimates the different manures were valued per ton as follows:—Sulphate of ammonia, £15 10*s.*; nitrate of soda, £12; superphosphate, £3 10*s.*; kainit, £3; salt, £1 10*s.*; farmyard manure, 4*s.*

The results obtained in 1914 seem to indicate that on peaty soils the reduction of the sulphate of ammonia in the standard mixture of artificials to 1 cwt. when applied along with dung is in some cases desirable. The very satisfactory crops obtained on such soils from the use of artificials alone is also a striking feature.

This experiment will be continued.

IV.—Variety Test.

These experiments, carried out to compare the relative cropping powers of different varieties of mangels, were conducted at 40 centres in 25 counties.

The average results for 1914, together with those of the four previous years, 1910-13, are reproduced in the following Table;—

Variety of Mangel.	1914 (40 Centres)		1910-13 (114 Centres)	
	Average yield per Statute Acre			
	T.	C.	T.	C.
Yellow Globe	37	14	30	3
Prize Winner	37	5	30	16
Long Red	31	18	27	9
Golden Tankard	30	7	23	18

In each of the five seasons under review, Prize Winner and Yellow Globe have given appreciably heavier crops than the Long Red and Golden Tankard varieties.

V.—OATS.

A.—Manurial Test (Old Series).

The object of this series of experiments was to test the effect of artificial manures when used singly and in combination on the oat crop. The experiments were commenced in 1901, and repeated each season until 1911, when the series was concluded. During the period mentioned the tests have been carried out:—

(*a*) At 150 centres distributed over the whole country.

(*b*) On a great diversity of soils.

(*c*) With the most commonly grown varieties of oats.

(*d*) During seasons differing widely in character.

Thus ample opportunity has been afforded of observing the effects of the various manurial dressings under practically all the conditions likely to be experienced by farmers in this country.

Detailed results of the experiments have been published from time to time by the Department, and by the various County Committees of Agriculture. It must suffice, therefore, in this report to present a comprehensive summary of the results for the entire period in as brief and readable a form as possible.

It should be stated that, during the first five years of the experiments, a plot dressed with kainit alone was included. Whilst the yield from this plot was slightly greater than that from the "no manure" plot, it was decided to discontinue the application of kainit alone, firstly, because the profit realised from such an application was very small,—in fact at some centres it resulted in a slight loss, and, secondly, because it is now generally understood that the most economical way to use potassic manures for cereals is in conjunction with nitrogenous and phosphatic manures.

The following Table shows the average returns for each season from the different plots, together with the general average figures for the complete series of experiments:—

Table I.—Showing the General Average Results of 150 Experiments carried out during the eleven years, 1901-11.

Year.	No. of Experiments.	Plot 1. No Manure.		Plot 2. 1 cwt. Sulphate of Ammonia.		Plot 3. 3 cwt. Superphosphate.		Plot 4. 1 cwt. Sulphate of Ammonia, 3 cwt. Superphosphate.		Plot 5. 1 cwt. Sulphate of Ammonia, 3 cwt. Superphosphate, 3 cwt. Kainit.	
		Average yield per Statute Acre.									
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
		cwt. qr.	cwt.	cwt. qr.	cwt.	cwt. qr.	cwt.	cwt. qr.	cwt.	cwt. qr.	cwt.
1901 .	9	13 1	22	16 1	27	16 0	27	19 0	33	20 1	35
1902 .	9	17 0	30	19 3	34	18 0	33	21 1	36	23 0	40
1903 .	18	14 0	26	15 2	29	16 2	27	19 0	33	21 0	38
1904 .	17	15 1	28	18 3	34	18 0	30	21 1	37	22 3	41
1905 .	22	15 2	23	18 0	27	17 3	26	20 3	31	21 1	33
1906 .	12	15 2	25	18 3	32	17 3	30	21 3	40	22 1	42
1907 .	14	17 3	28	20 2	34	21 3	35	24 3	43	25 2	48
1908 .	10	16 0	27	18 2	32	18 0	30	21 2	36	22 0	37
1909 .	11	17 0	27	19 1	32	19 2	31	22 0	36	23 1	39
1910 .	15	17 2	29	20 0	35	20 1	34	22 2	38	24 2	45
1911 .	13	14 2	20	17 0	25	17 2	24	19 3	27	21 2	30
Average Yield.		15 3	26	18 1	31	18 1	30	21 0	36	22 2	39
		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
Average Cost of Manures.		—		0 13 8		0 9 3		1 2 11		1 10 11	
Value of Crop, less Cost of Manures; Grain at 9d. per stone; Straw at 1s. 6d. per cwt.		6 13 6		7 2 4		7 5 3		7 17 1		8 2 7	

The showings of the figures set forth in the foregoing Table may be briefly summarised as follows:—

(1) That whilst the application of sulphate of ammonia alone on Plot 2, and of superphosphate alone on Plot 3, has, in each case, proved profitable on the whole, nevertheless, individual returns from both these plots have been variable, sometimes profitable, sometimes not.

(2) That the mixture of sulphate of ammonia and superphosphate used on Plot 4 was much more satisfactory than either manure applied alone on Plots 2 and 3.

(3) That throughout the experiments, the greatest profit and most satisfactory results were obtained from Plot 5, manured with the complete mixture including sulphate of ammonia, superphosphate and kainit.

B.—Manurial Test (New Series).

From the commencement of the Old Series of Oat Manurial experiments, distinctly the best and most uniform results were obtained from the application of the complete mixture of artificials composed of 1 cwt. sulphate of ammonia, 3 cwt. superphosphate, 3 cwt. kainit. Whilst 1 cwt. sulphate of ammonia may be regarded as a very suitable dressing of nitrogenous manure, it was deemed advisable to obtain more definite information regarding the most suitable quantities of superphosphate and kainit, respectively, to use in conjunction with sulphate of ammonia. Accordingly, in 1908, a New Series of experiments was commenced to test the effects of applying different quantities of superphosphate and kainit.

The experiments were concluded in 1913 after being repeated during six consecutive seasons. The tests have been carried out at eighty-one centres distributed throughout the whole country.

The following Tables show the plan of the experiments and general summaries of results :—

Varying Quantities of Superphosphate.

Table II.—Showing the General Average Results of 81 Experiments carried out during the six years 1908-13 :—

Year.	No. of Experiments.	Plot 1. No Manure.		Plot 2. 1 cwt. Sulphate of Ammonia, **2 cwt. Superphosphate,** 2 cwt. Kainit.		Plot 3. 1 cwt. Sulphate of Ammonia, **3 cwt. Superphosphate,** 2 cwt. Kainit.		Plot 4. 1 cwt. Sulphate of Ammonia, **4 cwt. Superphosphate,** 2 cwt. Kainit.	
		Average yield per Statute Acre.							
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw	Grain.	Straw
		cwt. qr.	cwt.	cwt. qr.	cwt.	cwt. qr.	cwt.	cwt. qr.	cwt.
1908,	6	15 1	19	20 3	28	23 0	31	22 1	30
1909,	17	14 2	23	22 1	36	22 1	37	22 1	37
1910,	14	15 0	26	19 3	37	21 3	37	22 2	39
1911,	13	13 2	20	17 3	23	19 3	26	19 1	26
1912,	18	17 2	31	21 1	40	22 2	42	23 2	43
1913,	13	15 2	25	20 2	33	21 0	36	21 1	34
Average Yield, 1908-13,		**15 1**	**25**	**20 2**	**34**	**21 3**	**36**	**22 0**	**36**
		£ *s.* *d.*		£ *s.* *d.*		£ *s.* *d.*		£ *s.* *d.*	
Average Cost of Manures.		—		1 7 0		1 10 4		1 13 8	
Value of Crop, less Cost of Manures; Grain at 9*d.* per stone; Straw at 1*s.* 6*d.* per cwt.		6 9 0		7 7 0		7 14 2		7 12 4	

Varying Quantities of Kainit.

Table III.—Showing the General Average Results of 81 Experiments carried out during the six years 1908-13:—

Year.	No. of Experiments.	Plot 1. No Manure.		Plot 3. 1 cwt. Sulphate of Ammonia, 3 cwt. Superphosphate, **2 cwt. Kainit.**		Plot 5. 1 cwt. Sulphate of Ammonia, 3 cwt. Superphosphate, **3 cwt. Kainit.**		Plot 6. 1 cwt. Sulphate of Ammonia, 3 cwt. Superphosphate, **4 cwt. Kainit.**	
		Average yield per Statute Acre.							
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
		cwt. qr.	cwt.	cwt. qr.	cwt.	cwt. qr.	cwt.	cwt. qr.	cwt.
1908, .	6	15 1	19	23 0	31	23 3	31	23 0	31
1909, .	17	14 2	23	22 1	37	22 1	36	22 1	36
1910, .	14	15 0	26	21 3	37	22 2	40	23 0	39
1911, .	13	13 2	20	19 3	26	18 3	26	20 0	28
1912, .	18	17 2	31	22 2	42	22 1	43	23 1	43
1913, .	13	15 2	25	21 0	36	21 0	35	20 2	35
Average Yield, 1908-13,		**15 1**	**25**	**21 3**	**36**	**21 3**	**36**	**22 0**	**36**
		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
Average Cost of Manures.		—		1 10 4		1 13 2		1 16 0	
Value of Crop, less Cost of Manures; Grain at 9*d.* per stone; Straw at 1*s.* 6*d.* per cwt.		6 9 0		7 14 2		7 11 4		7 10 0	

In 1912 an additional plot, No. 7, was included in the experiments to test the effect of applying 5 cwt. of the complete mixture of artificials as compared with that of the full quantity, 7 cwt., used on Plot 5.

The average results of this test for the two seasons 1912 and 1913 are shown in the following Table:—

VARYING QUANTITIES OF THE COMPLETE MIXTURE.

Plot.	Manure applied per Statute Acre.	Average Yield per Statute Acre, 1912-13 (31 Centres). Grain.	Straw.	Value of Crop less cost of Manures.
		cwt. qr.	cwt.	£ s. d.
1	No Manure	16 2	29	7 2 6
5	1 cwt. Sulphate of Ammonia 3 cwt. Superphosphate 3 cwt. Kainit (Full dressing)	21 3	39	7 14 0
7	5 cwt. of above mixture	21 0	36	7 15 0

It would appear from the results of the New Series of Experiments summarised in the foregoing Tables :—

(1) That the most generally suitable quantity of superphosphate is 3 cwt. per statute acre. In many cases 2 cwt. seems to be too light a dressing, whilst, on the other hand, as much as 4 cwt. is apparently unnecessary on land in average condition.

(2) That in most cases an application of 2 cwt. of kainit per statute acre is sufficient to meet the potash requirements of the oat crop.

(3) That, under ordinary circumstances, from 5 to 6 cwt. of a complete mixture of artificials is a sufficiently heavy dressing for oats.

The results of the New Series of experiments do not call for any notable modification of the advice given hitherto regarding the manuring of oats. The differences between the returns from Plots 3 to 7, inclusive, are so small that, for all practical purposes, the manurial dressings used on these plots may be regarded as having given similar results. Any advantage there may be, probably lies with the lighter dressings applied on Plots 3 and 7.

In view of these considerations, therefore, the Department are of the opinion that the quantity of kainit previously recommended in the Standard Mixture, viz., 3 cwt., might be reduced to 2 cwt. per statute acre.

Conclusions.—The results of both the Old and New Series of experiments, indicate very clearly that whilst farmers cannot always rely on getting a profitable crop increase from the use of sulphate of ammonia, superphosphate or kainit, when applied alone,

yet they may be confident of realising a profit when all three are used together in the following proportions :—

1 cwt. Sulphate of Ammonia,	per Statute Acre.
3 cwt. Superphosphate,	
2 cwt. Kainit.	

It should be observed that this dressing is recommended chiefly for oats grown on poor lea land, or for oats following a corn crop. It might also be applied to oats sown after a root crop to which no farmyard manure was applied.

In addition to increased yield, the following advantages will be derived from the use of such a mixture of artificial manures :—Grain of decidedly superior quality is produced ; the plants braird better, and suffer less injury from attacks of insect pests, such as wireworms and leather jacket grubs ; the corn ripens earlier, so that it is ready for cutting sooner than would otherwise be the case.

PRELIMINARY MANURIAL TESTS ON PEATY SOILS.

In many counties a considerable area of the oat crop is grown on soils of a peaty nature. It was considered desirable to investigate the special requirements of the oat crop on this class of land and a preliminary test was, accordingly, carried out at 7 centres in 7 counties in 1914.

The object of the series was to test :—

(1) The value of superphosphate alone and in combination with kainit as compared with the standard mixture, and

(2) To compare the results obtained from the standard mixture with those obtained from a mixture in which nitrate of soda was used instead of sulphate of ammonia.

The detailed returns, together with the average figures, are given in the following Table :—

Manurial Test on Peaty Soils.

Table showing the Returns per Statute Acre from each Centre.

Centre.	Percentage of Organic Matter as shown by Department's Analysis.	Plot 1. No Manure.			Plot 2. 3 cwt. Superphosphate.			Plot 3. 3 cwt. Superphosphate, 2 cwt. Kainit.			Plot 4. 1 cwt. Sulphate of Ammonia, 3 cwt. Superphosphate, 2 cwt. Kainit.			Plot 5. 1 cwt. Nitrate of Soda, 3 cwt. Superphosphate, 2 cwt. Kainit.		
		Grain.		Straw.	Grain.		Straw.	Grain.		Straw.	Grain.		Straw.	Grain.		Straw.
		cwt.	qr.	cwt.	cwt.	qr.	cwt.	cwt.	qr.	cwt.	cwt.	qr.	cwt.	cwt.	qr.	cwt.
Ballynagor, Dervock, Co. Antrim.	30·74	13	1	35	18	1	42	22	1	53	25	2	60	22	1	50
Ballywogs, Bruckless, Co. Donegal.	24·98	12	2	25	14	2	35	15	2	38	19	3	40	18	0	42
Killycramph, Lisnaskea, Co. Fermanagh.	28·27	16	2	38	19	0	42	26	1	51	23	0	56	22	0	54
Drumlamph, Bellaghy, Co. Londonderry.	42·25	12	3	26	16	0	29	16	0	31	23	1	37	22	0	45
Shraheens, Foxford, Co. Mayo.	18·86	10	2	15	20	2	36	22	0	34	23	1	34	18	1	27
Cloughanart, Emyvale, Co. Monaghan.	19·30	15	0	35	17	3	43	20	1	45	23	2	49	22	3	51
Drummin, Castlepollard, Co. Westmeath.	20·94	8	2	14	10	3	18	12	3	20	16	0	24	18	2	28
Average yield per Statute Acre,		**12**	**3**	**27**	**16**	**3**	**35**	**19**	**1**	**39**	**22**	**0**	**43**	**20**	**2**	**42**
		£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Cost of Manures,			—		0	10	6	0	16	6	1	12	0	1	8	6
Value of Crop, less cost of Manures; Grain at 9*d*. per stone; Straw at 1*s*. 6*d*. per cwt.		5	17	0	7	2	6	7	17	6	8	4	6	7	17	6

While these figures do not admit of anything beyond very general remarks it may be noted that:—

(1) All the manurial dressings have produced a profitable increase in the crop yield.

(2) The best results have been obtained from the use of the standard mixture applied to Plot 4.

(3) Applied in conjunction with superphosphate and kainit, nitrate of soda has not given as good results as sulphate of ammonia.

(4) The average yield of straw in proportion to grain was unusually high.

VARIETY TESTS.

This experiment was designed to test the cropping powers of certain newer varieties of oats as compared with old-established kinds, such as "Potato" and "Black Tartarian." In 1914, experiments were carried out at twenty-four centres in fourteen counties. The average yields of grain and straw produced by each variety, together with the average yields of each variety, obtained in similar experiments for the eight years, 1906–13, are shown in the following Table:—

Variety of Oat.	Average Yield per Statute Acre, 1914.			Average Yield per Statute Acre for 8 years, 1906-13		
	Grain.		Straw.	Grain.		Straw.
	cwt.	qr.	cwt.	cwt.	qr	cwt.
Abundance	23	3	29	21	2	33
Waverley	23	1	29	22	2	33
Banner	22	3	30	22	2	33
Black Tartarian	21	3	30	22	2	35
Potato Oat	21	2	32	21	1	35
Yielder	21	1	26	—		—

During the past three or four years the Department have devoted considerable attention to the improvement of oats by selection and hybridisation, and sufficient seed of several varieties, raised from single ears, was obtained in 1913 to sow large scale experiments at two centres in 1914. To this number two varieties raised at the

Swedish Plant Breeding Station, Svalöf—Victory, a white, and Black Great Mogul, a black variety—were added.

The following Table shows the yield of grain obtained from the various plots, which were in all cases 1 statute acre each.

Centre.	Abundance.		Banner.		Potato.		Kent Birlie.		Victory.		Black Great Mogul.	
	cwt.	qr.	cwt.	qr.	cwt.	qr.	cwt.	qr.	cwt.	qr.	cwt.	qr.
1. Albert Agricultural College,	20	3	25	3	16	0	—		31	3	—	
2. R. K. Wright, Mageney, Co. Kildare	—		19	1	—		16	0	20	3	20	2

Beyond noting the relatively high value of the Swedish oat Victory at both centres, these results do not at present call for any comment.

VI.—TURNIPS.

A.—Manurial Test (Old Series).

Two series of experiments on the manuring of the Turnip crop were commenced in 1901, with the following objects :—

(1) To test the effects of artificial manures in combination with farmyard manure.

(2) To test the effects of artificial manures used alone.

The experiments were repeated each year until 1911, when the two series were brought to a close.

During the eleven years covered by the experiments, two hundred and thirty-eight tests in Series I., and one hundred and forty-seven tests in Series II., were carried out. The experiments were conducted in every county in Ireland, on a great diversity of soils and with the leading varieties of Swede Turnips.

Detailed results of these experiments have been published each year in the Department's Journal and also in the annual reports issued by the various County Committees of Agriculture. This procedure has rendered unnecessary the reproduction of a large amount of data in this report.

As in the case of the Old Series of Field Experiments with other crops, the results of the manuial tests with Turnips are specially noteworthy for their uniformity each season.

Manurial Test with Farmyard Manure.

Table I.—Showing a General Summary of the complete Series, including the Returns from 238 Centres during the eleven years 1901 to 1911 inclusive:—

Year.	Number of Experiments.	Plot 1. No Manure.	Plot 2. 10 tons Farmyard Manure.	Plot 3. 20 tons Farmyard Manure.	Plot 4. 10 tons Farmyard Manure, 4 cwt. Superphosphate.	Plot 5. 10 tons Farmyard Manure, 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia.	Plot 6. 10 tons Farmyard Manure, 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia 3 cwt. Kainit.
		Average yield per Statute Acre.					
		T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
1901 .	16	5 8	19 4	23 19	23 10	24 5	24 13
1902 .	14	5 14	17 14	22 16	23 9	25 12	27 6
1903 .	22	2 4	14 15	19 3	20 9	21 19	23 13
1904 .	33	5 15	22 4	26 6	27 0	28 16	29 7
1905 .	21	7 3	20 9	23 9	25 0	25 11	26 15
1906 .	28	6 15	20 4	23 10	24 11	24 13	25 15
1907 .	32	7 16	18 19	22 9	23 5	24 14	26 0
1908 .	26	7 14	19 0	21 18	22 15	24 1	24 5
1909 .	23	6 8	18 14	22 15	23 6	24 1	25 11
1910 .	15	7 12	19 1	22 16	23 2	23 18	25 8
*1911 .	8	6 9	18 13	20 6	24 2	24 4	24 5
Average yield .		**6 5**	**19 0**	**23 0**	**23 16**	**24 19**	**26 0**
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Value of Crop: Turnips at 8s. per ton, .		2 10 0	7 12 0	9 4 0	9 10 5	9 19 7	10 8 0
Average Cost of Manures, .		—	2 0 0	4 0 0	2 12 4	3 6 0	3 14 0
Value of Crop, less cost of Manures, .		2 10 0	5 12 0	5 4 0	6 18 1	6 13 7	6 14 0

* In 1911, each of the manured plots in this series of experiments, except Plot 3, was dressed with 15 instead of 10 tons of farmyard manure, as was the case in previous years. Therefore the returns are not strictly comparable with those of the previous ten years, and, accordingly, the average yields for 1911 have not been included in the general average as set forth in the Table.

Manurial Test Without Farmyard Manure.

Table II.—Showing a General Summary of the complete Series, including the Returns from 147 Centres during the eleven years 1901 to 1911 inclusive:—

Year.	Number of Experiments.	Plot 1. No Manure.		Plot 2. 4 cwt. Superphosphate.		Plot 3. 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia.		Plot 4. 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 3 cwt. Kainit.	
		Average yield per Statute Acre.							
		T.	C.	T.	C.	T.	C.	T.	C.
1901	7	4	10	19	8	22	9	23	14
1902	10	5	11	17	12	18	10	23	5
1903	20	2	2	14	7	15	1	18	16
1904	18	4	9	20	7	21	18	24	18
1905	12	9	3	19	1	19	10	22	7
1906	27	4	19	18	5	19	11	22	16
1907	19	4	13	15	3	16	19	19	19
1908	15	4	17	16	4	18	2	20	18
1909	8	3	10	18	5	20	1	21	13
1910	6	5	7	18	4	21	12	24	2
1911	5	7	6	19	1	20	14	23	19
Average yield,		**4**	**17**	**17**	**9**	**18**	**19**	**22**	**0**

	Plot 1.	Plot 2.	Plot 3.	Plot 4.
	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*
Value of Crop: Turnips at 8*s.* per ton,	**1 18 10**	**6 19 7**	**7 11 7**	**8 16 0**
Average Cost of Manures,	—	**0 12 4**	**1 6 0**	**1 14 0**
Value of Crop, less Cost of Manures,	**1 18 10**	**6 7 3**	**6 5 7**	**7 2 0**

The conclusions that may be drawn from the foregoing Tables may be briefly epitomised as follows:—

Series 1.—(*a*) Comparing Plots 2 and 3 manured with 10 and 20 tons of dung respectively, it is seen that the heavier dressing increased the yield by 4 tons per acre. But even if the extra cost of applying the greater quantity of dung be neglected, the increase in yield of the crop failed to repay the cost of the additional manure, and a balance of 8*s.* per acre in favour of the lighter dressing is shown.

(*b*) A comparison of the average yields obtained from Plots 3 and 4 shows that where 4 cwt. superphosphate was used with 10 tons of dung, the yield was 16 cwt. greater than was obtained where dung was applied alone at the rate of 20 tons per acre. As the cost of the superphosphate was considerably less than that of the extra quantity of dung, the returns show a substantial profit in favour of Plot 4.

(*c*) On Plot 5 the addition of 1 cwt. sulphate of ammonia to the dressing of 10 tons of dung and 4 cwt. superphosphate applied on Plot 4 increased the yield by 1 ton 3 cwt. This increased yield, however, was produced at too great a cost to be profitable.

(*d*) The addition of 8 cwt. kainit on Plot 6 produced an increase in the yield of 1 ton 1 cwt. The value of this increase just paid the cost of the manure.

Series 2.—(*a*) Comparing the results from Plots 1 and 2 it is seen that the application of 4 cwt. superphosphate to Plot 2 produced an increase in the yield of 12 tons 12 cwt.

(*b*) On Plot 3 the application of 1 cwt. of sulphate of ammonia resulted in an increase of 1 ton 10 cwt. The value of this increase, however, was not sufficient to pay the cost of the manure.

(*c*) The heaviest average yield and the highest profit were obtained each season from Plot 4, manured with a complete mixture of artificials.

General Remarks.—It will be observed that in estimating the cost of the various manurial dressings which included farmyard manure, the full value of this manure has been charged to the Turnip crop. The fact is well realised and appreciated by farmers that succeeding crops derive much benefit from a liberal application of dung to a root crop, and the above method of estimating the cost of the farmyard manure may be objected to on the ground that no allowance is made for the considerable "residual value" which dung undoubtedly possesses. However, in tabulating experimental data of this nature, a definite value—perhaps a little arbitrary—must be placed on the manures. This is necessary because, owing to the conditions under which these field experiments are carried out, it is impossible to estimate definitely the residual value of the manure. The Department wish it to be understood, however, that it is no part of their policy to under-rate the value of farmyard manure. On the contrary, the main object of their field experiments has been to indicate how the supply of farmyard manure, which is generally limited, may be best supplemented with artificial manures. The economic use of farmyard manure is a question which many farmers might consider more carefully, and it is hoped that the results of these experiments will stimulate thought upon the subject.

It is common knowledge that, as a rule, turnips can be grown more successfully by means of artificial manures alone than can either potatoes or mangels. The second series of experiments confirms this belief. It is not recommended that the practice be generally adopted, but the expedient may be resorted to in the event of there being insufficient farmyard manure for the whole of the root break.

B.—Manurial Test (New Series).

Two new series of experiments were commenced in 1908 with a view to testing :—

(1) The effect of an increased dressing of superphosphate (*a*) in combination with farmyard manure, and (*b*) in combination with other manures containing nitrogen and potash, as compared with the dressing of 4 cwt. per statute acre previously recommended.

(2) The effect of basic slag as compared with superphosphate when used in conjunction with farmyard manure and with artificial manures containing nitrogen and potash.

Series I.—Dung and Artificial Manures.

During the past season these experiments, in which the two phosphatic manures were applied in conjunction with dung, were carried out at 28 centres in 17 counties.

The general average results of Series I. Experiments in 1914, and the six previous years, are summarised in the following Tables for easy comparison and reference :—

(*a*) Varying Quantities of Superphosphate.

Plot	Manures applied per Statute Acre.	1914. (28 Centres.) Average yield per Statute Acre.		1914. (28 Centres.) Value of Crop after deducting cost of Manures.			Average for 6 years, 1908-13. (23 Centres.) Average yield per Statute Acre.		Average for 6 years, 1908-13. (23 Centres.) Value of Crop after deducting cost of Manures.		
		T.	C.	£	s.	d.	T.	C.	£	s.	d.
1	4 cwt. Superphosphate, with Dung.	22	3	5	3	2	22	17	6	0	10
2	5 cwt. Superphosphate do.	22	4	5	0	1	23	15	6	5	2
3	6 cwt. Superphosphate do.	23	1	5	3	5	24	8	6	7	7

(*b*) Varying Quantities of Basic Slag.

Plot.	Manures applied per Statute Acre.	1914. (28 Centres)		Average for 6 years, 1908-13. (213 Centres.)	
		Average yield per Statute Acre.	Value of Crop after deducting cost of Manures.	Average yield per Statute Acre.	Value of Crop after deducting cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
4	4 cwt. Basic Slag, with Dung.	21 9	4 17 7	22 18	6 2 5
5	5 cwt. Basic Slag do.	22 1	4 18 11	23 10	6 3 8
6	6 cwt. Basic Slag do.	22 11	4 19 5	24 6	6 6 10

A comparison of the average figures for the past six years shows that the greatest difference in the net value of the crops from any two plots, is not more than 6*s*. 9*d*. per statute acre.

Series II.—Artificial Manures Used Alone.

The following Tables show the 1914 results in comparison with the average returns of the same experiments for the six previous years, 1908-13 :—

(*c*) Varying Quantities of Superphosphate.

Plot.	Manures applied per Statute Acre.	1914. (16 Centres.)		Average for 6 years, 1908-13. (133 Centres.)	
		Average yield per Statute Acre.	Value of Crop after deducting cost of Manures.	Average yield per Statute Acre.	Value of Crop after deducting cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
1	4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia and 3 cwt. Kainit,	20 8	6 4 8	22 11	7 3 7
2	5 cwt. Superphosphate do.	22 4	6 15 7	23 12	7 8 10
3	6 cwt. Superphosphate do.	22 9	6 14 1	24 11	7 13 3

(*d*) Varying Quantities of Basic Slag.

Plot	Manures applied per Statute Acre.	1914. (16 Centres.)		Average for 6 years, 1908-13. (133 Centres.)	
		Average yield per Statute Acre.	Value of Crop after deducting cost of Manures.	Average yield per Statute Acre.	Value of Crop after deducting cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
4	4 cwt. Basic Slag, 1 cwt. Sulphate of Ammonia and 3 cwt. Kainit, .	19 6	5 15 11	22 0	6 19 4
5	5 cwt. Basic Slag do.,	20 6	6 0 5	23 0	7 3 5
6	6 cwt. Basic Slag do.,	21 7	6 5 4	23 16	7 7 1

Since 1912 an extra Plot, No. 7, has been included in this series. with the object of showing the effect of applying three-quarters of the amount of the standard mixture of artificials used on Plot 1. The results of this test for the past two seasons are shown in the following Table :—

(*e*) Varying Quantities of the Standard Mixture.

Plot	Manures applied per Statute Acre.	1914. (16 Centres.)		Average for 2 years, 1912-13. (54 Centres.)	
		Average yield per Statute Acre.	Value of Crop after deducting cost of Manures.	Average yield per Statute Acre.	Value of Crop after deducting cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
1	4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 3 cwt. Kainit (full dressing), . .	20 8	6 4 8	21 17	6 16 5
7	6 cwt. of above mixture (three-quarter dressing)	19 15	6 9 2	20 8	6 14 5

The 1914 results may be summed up as follows :—

(*a*) The application of extra quantities of superphosphate or basic slag has resulted in an increased average yield.

(*b*) The value of this increase has, with one exception, viz., Plot 2, dressed with 5 cwts. superphosphate (*see* Table *a*),

more than sufficed to repay the cost of the extra quantity of manure used.

(*c*) The additional quantities of superphosphate and basic slag gave more profitable returns when artificial manures were used alone than was the case when farmyard manure formed part of the manurial dressing.

(*d*) Superphosphate has given rather better results than basic slag.

(*e*) The application of the full quantity of artificials on Plot 1 has not proved as profitable as three-quarters the amount of the same mixture on Plot 7.

Conclusions.—The results of both the Old and New Series of Experiments indicate :—

(1) That though good crops of turnips may be grown with farmyard manure alone, it is not economical to apply heavy dressings.

(2) That a medium dressing of farmyard manure, say from 10 to 15 tons per statute acre, supplemented by superphosphate or basic slag, is better than a heavy dressing of dung alone.

(3) That of the three kinds of artificial manures, nitrogenous, phosphatic and potassic, phosphatic manures alone materially increase the yield. When a medium dressing of dung supplemented by superphosphate or basic slag is used, it is very doubtful whether the addition of either sulphate of ammonia, or kainit, or both, will pay. But when no dung is used it is advisable to apply these manures along with superphosphate or basic slag.

The use of a complete mixture has one decided advantage, inasmuch as a more even braird is obtained, the plants are stimulated in their early growth, and consequently suffer less injury from attacks of the turnip fly.

(4) That superphosphate and basic slag are practically of equal value as manures for turnips. The question as to which should be used to supplement dung must be decided by local circumstances, but where the land is deficient in lime, or where the disease "Finger and Toe" is prevalent, basic slag should undoubtedly be applied.

(5) That as much as 6 cwt. per statute acre of either manure may be used with satisfactory results. Especially is this the case when no farmyard manure is applied.

(6) That, under ordinary conditions, the following manurial dressings may be thoroughly relied upon to give satisfactory results :—

(*a*) A medium dressing, from 10 to 15 tons, of farmyard manure supplemented with from 4 to 6 cwt. of superphosphate or basic slag per statute acre ; or

(*b*) The following dressing of artificials used without farmyard manure :—

4 to 6 cwt. of Superphosphate or Basic Slag, } per Statute Acre.
1 cwt. Sulphate of Ammonia, }
3. cwt. Kainit, }

Basic slag must on no account be mixed with sulphate of ammonia.

C.—Manurial Tests on Peaty Soils.

These tests were commenced in 1912 with the view to ascertaining the best method of manuring turnips on pronounced peaty soils. Unfortunately most of the experiments arranged for on such soils during the past season had to be abandoned owing to crop failures. The results from 3 centres are given, however, in the Table on page 311, together with the average figures for the two previous seasons.

The most noticeable features of the results that have so far been obtained are

(*a*) That superphosphate and basic slag are practically of equal value as manures for turnips grown on peaty soils.

(*b*) The satisfactory returns obtained from the use of artificial manures alone.

D.—Variety Test.

The object of this experiment was to test the cropping powers of different varieties of swedes and yellow turnips.

Experiments were carried out at 30 centres in 18 counties by Agricultural Instructors, and by Agricultural Overseers at 42 centres in Congested Districts.

The average results of these tests in 1914, and the four previous years, are given in the following Tables :—

County Experiments.

Variety.	Average yield per Statute Acre, 1914. (30 Centres.)		Average yield per Statute Acre, 1910-13. (105 Centres.)	
	T.	C.	T.	C.
SWEDES.				
Magnum Bonum, ...	24	1	24	6
Triumph,.	23	10	24	7
Shamrock , ...	23	0	—	
Best of All, ...	22	14	24	6
Incomparable Green Top, . .	22	9	24	0
Improved Purple Top, . . .	21	16	23	6
YELLOW TURNIPS.				
Centenary, ...	27	16	*30	14
Aberdeen Green Top, . . .	22	19	*25	8

* Average of 98 Centres only.

Congested Districts' Experiments.

Variety.	Average yield per Statute Acre, 1914. (42 Centres.)		Average yield per Statute Acre, 1910-13. (143 Centres.)	
	T.	C.	T.	C.
SWEDES.				
Triumph,	25	13	25	15
Best of All,	25	4	25	18
Magnum Bonum,	24	3	25	5
Incomparable Green Top,	24	1	24	9
Shamrock,	23	10	—	
Whitsuntide Bronze Top,	23	1	24	14
Abundance,	22	12	24	15

As in previous years the varieties Magnum Bonum, Triumph, and Best of All have given the best results, and these kinds may be regarded as reliable general-purpose swedes. Shamrock was included for the first time in 1914. Incomparable Green Top and Whitsuntide Bronze Top are good keeping swedes but not quite such heavy croppers as the four purple topped varieties already mentioned.

Of the Yellow turnips, Centenary has almost uniformly produced considerably heavier crops than Aberdeen Green Top. Centenary should be used early.

[TABLE

Manurial Tests on Peaty Soils.

Table showing the Returns per Statute Acre from each Centre.

Centre.	Percentage of Organic Matter as shown by Department's Analysis.	Variety of Turnip.	Plot 1 15 tons Farmyard Manure.	Plot 2 15 tons Farmyard Manure, 4 cwt. Superphosphate.	Plot 3 15 tons Farmyard Manure, 4 cwt. Slag.	Plot 4 15 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Kainit.	Plot 5 15 tons Farmyard Manure, 4 cwt. Slag, 2 cwt. Kainit.	Plot 6 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 3 cwt. Kainit.	Plot 7 4 cwt. Slag, 1 cwt. Sulphate of Ammonia, 3 cwt. Kainit.
			T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
Coolinarne, Millstreet, Co. Cork,	22·42	Best of All	24 1	26 1	26 16	26 6	26 7	26 1	25 4
Blacktrench, Naas, Co. Kildare,	40·0	Purple Top	15 0	18 15	18 10	18 15	18 10	14 15	15 5
Kilgarrow, Newtownbutler, Co. Fermanagh,	33·74	Improved Purple Top	19 15	24 15	25 13	25 17	26 11	23 15	23 18
			T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
Average yield per Statute Acre,			19 12	23 4	23 13	23 13	23 16	21 10	21 9
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cost of Manures,			3 0 0	3 14 0	3 14 0	4 0 0	4 0 0	1 18 6	1 18 6
Value of Crop, less Cost of Manures; Turnips at 8s. per ton,			4 16 10	5 11 7	5 15 2	5 9 2	5 10 5	6 13 6	6 13 1
Do. Do. for 1913 (8 centres)			4 7 2	5 7 2	5 4 10	5 9 2	5 2 5	7 4 4	7 2 4
Do. Do. for 1912 (5 centres)			3 3 2	4 1 7	5 0 0	5 8 5	5 3 7	6 11 11	6 14 4

VII.—WHEAT.

The experiments in wheat cultivation carried out during the past season consisted of the two following series:—

Series I.—Large Scale Experiments.

The experiments in this series were conducted with the object of ascertaining the relative values of Red Fife and Queen Wilhelmina when grown on (*a*) a strong loam, and (*b*) a light gravelly soil. The two centres chosen for these experiments were the same as in 1913, namely, the Albert Agricultural College, Glasnevin, and Messrs. Brown and Crosthwait's Farm, Bagenalstown, Co. Carlow. Excepting that the investigation was confined this year to two varieties instead of four as in 1913, the object and details of the experiments were the same as those of that year.

Series II.—Small Scale Experiments.

These were conducted by Agricultural Instructors in eight counties, at seventeen centres.

The varieties tested were:—White Stand Up, White Queen, Red Fife, and Red Chaff White, and the size of the plots varied from one-eighth to one-quarter of an acre.

The returns per statute acre from both series of experiments are shown in the following tables:—

Series I.—Large Scale Experiments.

Size of each plot, one statute acre.

Experimental Centre.	Character of Soil.	Red Fife.		Queen Wilhelmina.	
		Brls.	Stns.	Brls.	Stns.
Albert Agricultural College, Glasnevin . . .	Strong loam .	10	10	12	18
Brown & Crosthwait, Bagenalstown, Co. Carlow . .	Light gravelly soil . .	9	0	11	0
Average yield of good corn per statute acre . . .	—	**9**	**15**	**11**	**19**
Ditto, 1913 . . .	—	**10**	**5**	**14**	**2**

Series II.—Small Scale Experiments.

Name and Address of Farmer.	Character of Soil.	Red Fife			Red Chaff White.			White Stand Up.			White Queen.		
		Grain.		Straw	Grain.		Straw	Grain.		Straw	Grain.		Straw
		cwt.	qr.	cwt.	cwt.	qr.	cwt.	cwt.	qr.	cwt.	cwt.	qr.	cwt.
Wm. O'Connell, Ballinrostig, Aghada, Co. Cork	Gravelly Loam	18	1	18¾	18	2	17¼	18	2	21¼	22	2	28½
John O'Brien, Clonard, Youghal, Co. Cork	Deep Loam	26	0	—	23	0	—	24	0	—	24	1	—
David White, Tullineasky, Clonakilty, Co. Cork	Rich Loam	29	0	52	22	2	37	37	0	47	30	1	38½
Patrick M'Carthy, Drinagh, Co. Cork	Dark Loam	20	0	—	20	0	—	23	0	—	17	0	—
Mrs. Coakley, Ballineen, Co. Cork	Medium Loam	28	2	42	32	2	31	32	0	31½	32	0	46½
W. J. Young, Ballyward Co. Down	Loam	18	1	30	18	3	34	22	2	35	22	3	35
J. Bookle, Thomastown, Co. Kilkenny	Loam	17	1	41	18	1	38	20	1	39	20	3	47
E. Gorman, Bennetsbridge, Co. Kilkenny	Strong Loam	17	1	45	18	3	42	19	3	43	20	1	49
W. J. Reynolds, Moneymore, Co. Londonderry.	Gravelly Loam	14	1	29	17	3	34	21	0	34	18	3	35
James O'Boyle, Killala, Co. Mayo	Clay Loam	19	3	39	16	2	40	23	1	48	22	2	44
James Murphy, Kilmaine, Co. Mayo	Limestone Clay	19	2	30	20	1	34	22	3	40	20	0	36
Patrick Connolly, Boyle, Co. Roscommon	Heavy Loam	23	2	38	25	3	39	29	0	36	28	2	36
Peter MacDermott, Elphin, Co. Roscommon	Limestone Clay	21	0	—	26	1	—	28	0	—	24	0	—
John Gleeson, Nenagh, Co. Tipperary	Loam	20	0	53	28	2	67	24	1	61	22	3	57
Wm. Collins, Nenagh, Co. Tipperary	Clay Loam	31	2	51	33	3	57	35	1	54	32	3	57
Edmond O'Hanrahan, Glenacunna, Co. Tipperary	Loam	18	2	33½	25	1	42½	28	3	45	23	1	38½
William F. Glasheen, Crohane, Co. Tipperary	Limestone	22	0	37½	25	3	43	24	2	42	24	3	39½
Average yield per statute acre		21	2	39	23	0	40	25	2	41	24	0	42

	Red Fife		Red Chaff White		White Stand Up		White Queen	
	brls.	stns.	brls.	stns.	brls.	stns.	brls.	stns.
Average yield of grain per statute acre in barrels of 20 stones	8	12	9	4	10	4	9	12
,, ,, ,, ,, ,, 1912	7	16	8	16	8	6	8	18
,, ,, ,, ,, ,, 1911	7	18	10	16	12	8	10	2
,, ,, ,, ,, ,, 1910	7	2	8	8	9	12	8	16
,, ,, ,, ,, ,, 1909	7	2	—		9	14	9	2
,, ,, ,, ,, ,, 1908	6	9	—		10	2	9	4
Average for six years	7	10	9	6	10	1	9	6

Remarks.

In view of the present national circumstances which have necessitated an immediate extension of the area devoted to wheat in these islands it is desirable in this report to present a short account of the results of the experiments in wheat growing which have been conducted by the Department during the past seven years.

Wheat grown in Ireland is usually utilised in three distinct ways:—(1) It may be ground and used by the grower for domestic purposes, (2) it may be utilised by distilleries, and (3) it may be purchased by millers and converted into flour.

Whilst the quantities used for domestic purposes and by distilleries are limited, a very large quantity could be used in the manufacture of flour, provided the quality of the wheat produced is of a standard sufficiently high to meet the milling requirements of the country.

Some of the flour manufactured in this country is used for home baking, but the greater portion of it finds its way to bakeries.

It has been found that for the latter purpose the most valuable wheat is one possessing what millers term high "strength," which, in many cases, but not invariably, is associated with a high albuminoid content in the grain. Red Fife is a characteristic variety of this class, and as such, under normal circumstances, commands a higher commercial value than varieties such as White Stand Up, White Queen, Square Head Master, Red Chaff White, etc. Wheats of the Fife class are cultivated extensively in Canada and the United States of America, whence Irish supplies of milling wheats are largely obtained.

For special purposes, amongst which may be mentioned biscuit-making, wheats such as White Stand Up, White Queen, etc., may be profitably utilised; they can also be used to a small extent to mix with strong flour for bread-making.

But if wheat-growing in this country is to be extended with a view to producing flour for bakers' bread, it will be necessary to cultivate "strong" wheats of the Red Fife class.

The Department's investigations, which commenced in 1908, were, therefore, devised to ascertain (*a*) whether Red Fife could be grown in Ireland and maintain its character of high "strength," (*b*) its value per acre, measured in terms of productivity of grain as compared with other and less "strong" wheats, and (*c*) the relative values of several native varieties.

(*a*) Red Fife has now been grown in Ireland under experiment for *seven* consecutive seasons, without change of seed, and in point of milling quality it possesses as high a strength as when it was introduced originally in 1908.

(*b*) The following table, which shows the average yield for the whole of the experimental plots for seven years may be considered in two parts. For this purpose the results of the years 1908 to 1911 and then of 1912-1914 should be classed together. Square Head Master was grown for two seasons, 1908 and 1909, after which, owing to its low milling value, it was discarded, and Red Chaff White substituted.

Table showing the average yield of varieties for the years 1908-1914, inclusive.

Year	White Stand Up.		White Queen.		Red Fife.		Square Head Master.		Red Chaff White.		Queen Wilhelmina.	
	Brls.	Stns.	Brls.	Stns.	Brls.	Stns.	Brls.	Stns.	Brls.	Stns.	Brls.	Stns.
1908 . .	10	18	9	18	7	15	11	6	—		—	
1909 . .	9	14	9	7	7	16	10	7	—		—	
1910 . .	10	10	9	2	7	17	—		10	2	—	
1911 . .	11	0	9	14	9	8	—		10	6	—	
1912 . .	—		—		10	12	—		—		11	16
1913 . .	—		—		10	5	—		10	11	14	2
1914 . .	—		—		9	15	—		—		11	19
Average 1908–1911 inclusive	10	10	9	10	8	4	—		—		—	
Average 1912–1914 inclusive	—		—		10	4	—		—		12	12

The average yields of White Stand Up, White Queen, and Red Fife for the years 1908-1911, inclusive, are as follows:—

White Stand Up.		White Queen.		Red Fife.	
Brls.	Stns.	Brls.	Stns.	Brls.	Stns.
10	10	9	10	8	4

From these figures it is evident that the productivity of Red Fife at that time was inferior to White Queen, and still more so to White Stand Up. Basing the value of White Stand Up at 20*s*. per barrel, the price which would have to be paid for Red Fife to make it equally remunerative to the grower is about 25*s*. per barrel, a figure considerably over what was actually obtained during the years in question.

It was noticed, however, in 1908 and 1909, that the Red Fife plots showed a considerable mixture of "foreign" heads but, by means of the very laborious method of picking these "strangers" out by hand, from an acre of Red Fife, sufficient partially purified seed was obtained to sow the whole of the experimental plots in 1911. To this purification of the seed some of the relatively increased yield shown by the results obtained in 1911 may be attributed. In 1912 White Stand Up and White Queen were discarded, and

Queen Wilhelmina substituted. This wheat is probably a higher yielder than White Stand Up, and comparisons with Red Fife can safely continue to be made.

In 1909 several *single ear* selections were made from plots of Red Fife, and the produce of each was cultivated separately, until, in 1912, sufficient seed of the best selection was obtained to sow all the experimental plots. The resulting produce of this seed not only showed a marked advance in return per acre, but in evenness of ripening and size of grain was distinctly superior to anything that had yet been obtained with Red Fife. The improvement in productivity was maintained in 1913 and 1914, and thus, whilst the average yield for the four years 1908-1911 inclusive, was 8 brls. 4 stns., that of the three years, 1912-1914 (in all of which the produce of the same single ear culture was used), was 10 brls. 4 stns.

As the quality of Red Fife, in every year since the experiments were commenced, has been sufficiently higher than that of other varieties to command an enhanced price of 2*s*. per barrel more, and as the yield can now be considered to be about 10 brls. to the statute acre, the question of the relative values of this and other wheats may now be considered.

Assuming that the Red Fife seed, raised from a single ear by the Department, is about two barrels to the acre better than that used in 1908-1911, which the results obtained amply justify, the difference in yield between White Stand Up and Red Fife on the average would appear to be ten stones per acre. If the value of Red Fife is 2*s*. per barrel above that of White Stand Up the extra ten stones of the latter is insufficient to make up the deficiency in total value per acre. The position of other varieties is as follows :—

White Queen is at least one barrel to the acre inferior to White Stand Up and consequently does not approximate to Red Fife in value per acre.

Square Head Master is probably a more productive variety than White Stand Up, but is of low milling value.

Red Chaff White is about equal to Red Fife in yielding capacity, but is not of equal milling value and consequently falls below it in value per acre.

Queen Wilhelmina is a prolific variety and its yield is sufficient, even with a lower milling value, to produce a higher monetary return per acre than Red Fife.

These observations must not be construed into a recommendation for the general cultivation of Red Fife. The requirements of different markets vary very considerably, and the grower should adapt

himself to his market as far as conditions permit. In cases where there is a decided differential value in favour of Red Fife, this variety may be profitably cultivated. Apart from the actual value the grower may obtain for Red Fife, the following general considerations should be given their due weight when deciding on which variety to grow :—

1. In some districts a very large quantity of Red Fife wheat can be utilised by millers, and there is consequently a good market for the produce.

2. Red Fife is an early ripening wheat and can be sown until late in the spring.

3. Red Fife does not suffer greatly from adverse harvesting conditions, and under equal conditions of weather it has, during the past seven years, always been marketed in better "condition" than other varieties.

White Stand Up is characterised by stiff, upstanding straw and a dense head. It has been observed repeatedly, in wet seasons, that this wheat is particularly liable to sprouting in the ear even before cutting, and in all, except the driest seasons, it is difficult to get the grain into proper condition. As far as observations with Queen Wilhelmina have been made this wheat does not appear to suffer from these inherent disadvantages of White Stand Up.

There are three cultural conditions which must be observed in the case of Red Fife :—(1) It is a spring wheat and succeeds best when treated as such. (2) It is incapable of withstanding the effects of anything approaching the nature of stagnant water, and is consequently well suited to light, gravelly, well-drained soils. (3) It is a poor tillerer, and seed should accordingly be sown at a rate of not less than eighteen stones per statute acre.

The suitability of Red Fife for light, gravelly soils, together with its decided character of a spring wheat, suggest at once close similarity to the cultural conditions generally considered necessary for barley.

The characteristics of soil essential for Red Fife do not correspond closely to those generally accepted as being requisite in the case of the other varieties dealt with in this report. On many of the light soils of the Midland counties the question may thus resolve itself into the relative values of Red Fife and barley rather than of Red Fife and the generally cultivated native varieties of wheat. In this connection the following figures are interesting.

On Messrs. Brown & Crosthwait's farm, Bagenalstown, Co. Carlow, experiments were conducted with wheat—Red Fife and Queen Wilhelmina (see Series I.)—and with barley—Archer and Beaven's "145"—in *the same field*, the whole of which had been treated in an identical manner in 1913 and 1912.

The produce and total value per statute acre of the two barleys were as follows :—

	Yield Brls.	Yield stns.	Value £	Value s.	Value d.
Archer	11	6	8	19	2
Beaven's "145"	11	10½	9	0	8

whilst that of Red Fife was 9 barrels (of 20 stones) which, at the date it was sold in the local market, realised 22*s.* per barrel, or a value per statute acre of £9 18*s.*

Regarding the results of the experiments for 1914—the relative yields per acre of Red Fife and Queen Wilhelmina at the two centres in 1913 and 1914 are given below, and in view of these figures it cannot be said that the character of the soil at either centre has exerted any influence on the relative yields of either variety

RELATIVE YIELDS OF RED FIFE AND QUEEN WILHELMINA.

		Red Fife Brls.	Red Fife Stns.	Queen Wilhelmina Brls.	Queen Wilhelmina stns.
1913	Glasnevin	10	0	13	14
,,	Bagenalstown	10	0	13	16
1914	Glasnevin	10	0	12	6
,,	Bagenalstown	10	0	12	4

The results obtained in Series II. corroborate those of previous years, excepting that the relative yield of Red Fife is enhanced. This is probably the effect of the use of purer seed than was procurable in past years.

SUMMARY AND RECOMMENDATIONS.

1. Of the six varieties tested, Queen Wilhelmina, Square Head Master, and White Stand Up have proved the most prolific, whilst White Queen and Red Chaff White are only equal to Red Fife in this respect.

2. In point of milling quality Red Fife is superior to all the other varieties.

3. Where a differential commercial value in favour of high milling quality is placed on the above wheats Red Fife may prove a remunerative wheat to cultivate, especially in districts where the soil is of a light gravelly nature.

4. Red Fife is a spring wheat but the other five varieties, although they may succeed in certain soils and in certain seasons when treated as spring wheats, can be more safely recommended for use as winter wheats.

5. In view of the high-yielding capacity of Queen Wilhelmina, and of the superior milling value of Red Fife, the Department can confidently recommend these two varieties to the notice of wheat growers. With regard to the latter variety they advise close observance of the cultural conditions detailed above, and also recommend farmers to use only *pure pedigreed seed.* Supplies of the Department's single-ear selection are now being propagated in several districts, and it is hoped by the end of next season to have a large supply for use as seed.

Manuring.

When sown after roots, it is not necessary to use any artificial manure with wheat, except in the event of the plants tillering badly, or of a severe wireworm attack, when 1 cwt. of nitrate of soda per statute acre may be profitably applied. If wheat is sown after another corn crop, a dressing of from 2 to 3 cwt. superphosphate, and, if the land is light, 2 to 3 cwt. kainit, per statute acre might be applied at the time of sowing the seed. This should be supplemented in spring with about 1 cwt. nitrate of soda per statute acre.

Dressing of Wheat Seed for the Prevention of Smut.

The presence of smut in a crop of wheat not only involves a loss to the farmer in yield, but has a detrimental effect on the quality of the produce. It is therefore extremely desirable to adopt some precautionary methods for the prevention of smut. One of the simplest of these is to dress the seed before sowing with copper sulphate solution in the following manner:—Dissolve ½ lb. of copper sulphate in 1 gallon of water, which quantity of solution is sufficient to dress 20 stones of wheat. The corn should be spread out on a clean loft floor, and the solution may then be carefully sprinkled over it, and the whole repeatedly turned until each grain receives a coating of liquid. When this is done the wheat should be spread out in a thin layer and left to dry. If necessary it may be turned again. The operation should be carried out just immediately previous to sowing, and under no consideration should an attempt be made to sow the wheat before it is absolutely dry.

Copies of these reports in leaflet form (Nos. 36 to 41 and 61) may be obtained, free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.

OBSERVATIONS UPON THE TUBERCULIN TEST AS APPLIED TO BOVINE ANIMALS.

During the present year, experiments were carried out by the Veterinary Hygiene Division of the Department of Agriculture and Technical Instruction for Ireland, to determine certain problems in connection with the use of Tuberculin. The line of inquiry followed the course indicated by the paragraphs numbered 1 to 4 below.

(1). It is held that an injection of tuberculin administered shortly before the testing of the animal is carried out seriously diminishes the reliability of the test. If this is so what length of time should be allowed to elapse after the primary injection before the test can be accurately carried out ?

(2). Is the power of resistance to the test so conferred increased by the use of a larger dose of tuberculin than that usually employed, or by repeated doses ?

(3). Are there any means at our disposal by which we can, with reliable results, test an animal which has received treatment by tuberculin prior to the test ?

(4). Can the ophthalmic or intradermal method of testing be relied on generally, or after treatment with subcutaneous injection of tuberculin ?

For the benefit of those who have not gained a knowledge of the nature of the Tuberculin test and the method of its application, the following brief explanation is offered :—

Usual method of testing.

It has been found that when a bovine animal is affected with tuberculosis certain definite results are obtained when a small quantity of a substance known as tuberculin is injected under the skin. The most important result is a temporary elevation of the body temperature of the animal thus treated. The rise in temperature is ascertained by using a clinical thermometer, and a typical reaction occurs at a definite period after the injection of the tuberculin and in a certain well recognised manner, i.e., a gradual rise commencing at the 9th hour, reaching its height between the 12th and 15th hours, then falling to normal before the 21st hour. If the animal is healthy no alteration in temperature takes place.

The Ophthalmic Method.

The ophthalmic reaction is obtained by placing a few drops of concentrated tuberculin between the eyelids of the animal. If tuberculosis is present a definite result is noticeable within the 6th to 18th hours afterwards and consists of an inflammatory change in the eye thus treated, with a characteristic discharge.

The intradermal reaction is obtained by injecting a small quantity of concentrated tuberculin into one of the folds of skin such as those situated underneath the animal's tail. If tuberculosis is present well marked thickening of the treated fold occurs within 18 hours.

The Intradermal Method.

It may therefore be stated that in tuberculin we have an agent by means of which we can prove the presence or absence of tuberculosis in the animal. It has been found however that when an animal has been shown to be the victim of tuberculosis by means of the subcutaneous method a second injection of tuberculin given some days after the first dose has failed to produce any reaction. The first injection evidently therefore confers upon the animal a power of resistance to the second injection. This fact has occasionally been availed of by unprincipled persons for fraudulent purposes, and it has therefore become necessary to ascertain how far the reliability of the tuberculin test is affected under such circumstances and what measures can be adopted to counteract any attempt to render the test abortive.

Before giving details and temperature charts of our experiments, in which we made use of three hundred reacting cows, and which would be of little interest to any but Veterinarians, the conclusions arrived at may be summarised as follows :—

Conclusions arrived at.

I. It has been proved beyond doubt that an injection of tuberculin will confer upon a tuberculous animal the power of resistance to a second injection for a certain period.—*Vide* Table I.

II. If the amount of the first injection be increased, no increase in length of the period of resistance to a second injection occurs.—*Vide* Table V.

III. This acquired power of resistance to the action of tuberculin was found to be retained for

One week in	100%	of cases—*Vide* Table	I.
Two weeks ,,	50%	,, ,, ,,	,, II.
Three ,, ,,	33%	,, ,, ,,	,, III.
In no case did it continue for 4 weeks		,,	,, IV.

IV. If in testing animals which had previously received an injection of tuberculin a double dose be employed then a reaction will be obtained between the 3rd and 6th hours in at least 45% of cases.

V. Repeated injections of tuberculin at intervals of fourteen days or twenty-one days gradually increases the number of animals in the groups which will resist a further injection.—*Vide* Table VI.

It has been found that if a group of animals be injected with a dose of tuberculin every fourteen days until four doses have been

given, then on the fifth injection no reaction follows in any of the animals. A longer period is required to obtain the same results if the doses be separated by three-weekly intervals.

VI. The ophthalmic and intradermal methods of testing have proved entirely satisfactory in our hands. Easily demonstrable reactions have been obtained in animals previously or simultaneously subjected to subcutaneous injection of tuberculin, also in animals tested by the ophthalmic and intradermal methods one week previously.—*Vide* Tables VII. and VIII.

We have frequently noticed that clinical examination alone fails to show tuberculosis even when the purchaser has had a life long experience of stock.

Before purchasing animals it is therefore advisable to apply the tuberculin test in order to know whether tuberculosis is present or not.

If it is wished to obviate all chance of error in the use of tuberculin as a diagnositic agent it is essential to adopt one of the following courses :—

(*a*) To keep the animals under strict supervision for one month before testing.

(*b*) To use the ophthalmic or intradermal test in addition to the subcutaneous method. This invariably gives satisfactory results.

(*c*) To use double doses and take the temperature at the third and sixth hour after injection when a reaction will be obtained in 45% of cases in animals recently injected.

It will be of interest to dairy proprietors and of importance to the community to know that during these experiments it was demonstrated that it is possible at comparatively moderate cost to eliminate tuberculosis from a dairy herd, and to maintain that condition of freedom from the disease. By these means it is possible to maintain a supply of milk free from the germs of Bovine Tuberculosis.

It must be pointed out, however, that the slightest relaxation of precautions may render all previous efforts abortive by the re-introduction of the disease.

The results of thirty-nine post-mortem examinations are appended showing that the tuberculin test proved reliable in 100% of cases even when the merest trace of disease existed.

The experiments upon which this report is based were carried out in various parts of Ireland, a very large number of cows having been tested before the requisite number of tuberculous animals could be made available.

The greater part of the work was done by Mr. B. H. Mellon, F.R.C.V.S., and in the latter part assistance was given by Mr. T. K. Reddin, M.R.C.V.S., who confirmed some of the tests by suitable controls.

FALKNER C. MASON.

SELECTED TABLE I.

Showing that one injection of tuberculin confers resistance to a second dose administered one week later in 100% of cases in tuberculous animals.

First Testing.

No. of Cow.	Temp. 24 hrs. before Testing	Temp. at Time.	3rd Hour.	6th Hour.	9th Hour.	12th Hour.	15th Hour.	18th Hour.	Age.	Dose.
317	102·2	101·8	101·6	101·6	104·2	107·4	106·2	105·2	13	4 c.c.
80	101	101·5	102	102·2	102·8	105	105·2	102·2	5	„
5	101	101·5	101·8	101·6	101·8	104	105·8	104·8	13	„
40	102	101·4	102	102·2	104·4	105·4	104	103·8	4	„
30	101	101	101·2	102	103	103·6	106	105·2	5	„
74	101·2	101	100·8	101·4	104	106	106·8	105·4	8	„
R 738	102	101·6	100·8	101·8	102·8	103	105·8	105	8	„
43	102	101·4	102	102·2	103·2	105	105·2	104·4	3	„
R 343	101·6	101·2	101·2	101·8	102·4	104·6	106	105·4	9	„
23	100·8	101·2	102	102	103·8	104·6	104·2	104	7	„

Second Testing after One Week.

317	101·4	102	102·8	103	102·2	102	101·6	102		4 c.c.
80	100·8	101·2	101·6	102	101·6	102·2	101·6	101·4		„
5	101·2	101	101·6	101·4	101	101·2	101·2	101·4		„
40	101·4	101·2	102	102·8	102	102	101·8	101·8		„
30	100·6	101·2	101·6	101·8	101·4	101·4	101·4	101·4		„
74	101	101·6	102·6	103	102·4	102	102	102·2		„
R 738	101·8	101	102	101·8	101·4	102	101·6	101·6		„
43	101·6	101·2	101·2	101·4	101·4	101·2	101·2	101·2		„
R 343	101·4	101·4	102·6	102·8	103	102·2	102	102		„
23	101·6	101·2	101	101·4	101·6	101·6	101·6	101·8		„

The above table also shows a reaction occurring at the third and sixth hours in 40% of cases.

SELECTED TABLE II.

Showing that an injection of Tuberculin confers resistance to a second dose administered two weeks later in 50% of cases in tuberculous animals.

II. A. FIRST TESTING.

No. of Cow.	Temp. 24 hrs. before Testing	Temp. at Time.	3rd Hour.	6th Hour.	9th Hour.	12th Hour.	15th Hour.	18th Hour.	Age.	Dose.
59	101	101·6	102·4	103	107·4	106	105	104·8	10	4 c.c.
51	101	101	102	103·2	106	106	105·4	105	5	,,
84	101·4	101·6	102	104·2	105	105·4	106	104·2	4	,,
31	101·4	101·2	102·8	103	105·4	105·6	104·2	103·2	4	,,
17	100·8	102	102·4	103	106	106·2	105·4	104	4	,,
25	102	101·4	103	103·2	106	106·4	104·4	104·4	4	,,
33	101·4	101·4	101·8	102	105·2	105·2	105	104·8	4	,,
69	101·6	101·2	101·6	101·8	103	105·8	106	104·2	5	,,
70	101	101·8	101·8	102	103·2	106·2	104·8	104·2	5	,,
41	101·4	101·4	101·6	102	103·4	103·8	104·8	104·4	8	,,
66	101·8	101·6	102	102	105·4	106·4	105·2	105	7	,,
38	102	101·8	101·8	102	105·6	106·2	106	104·8	10	,,
87	101·6	101·4	102	102·4	105·4	106	105·2	105·2	8	,,
72	102·2	101·8	102·4	103	104·2	105·2	104·8	104·2	4	,,

II. B. SECOND TESTING AFTER 14 DAYS INTERVAL.

No. of Cow.	Temp. 24 hrs. before Testing	Temp. at Time.	3rd Hour.	6th Hour.	9th Hour.	12th Hour.	15th Hour.	18th Hour.	Age.	Dose.
59	102·2	101·6	102	105	103·2	102·8	102·2	102		4 c.c.
51	102	101·4	101·6	102·2	102	102	102	101·8		,,
84	100·8	101	102·2	103	104	104·2	103·8	103·8		,,
31	101·6	101·4	101·6	102·8	101·8	101·6	101·6	101·6		,,
17	101·4	100·8	102·2	103·4	106	105·4	104·8	104		,,
25	101·2	101·2	101·6	101·8	102	102	101·6	101·6		,,
33	101	101·6	100·8	101·2	101·8	101·8	101·6	101·6		,,
69	101·6	100·4	101·4	101·6	104	105	105·2	104·8		,,
70	101·6	101·4	102	103	104·6	104·2	104	104		,,
41	101	101·2	101·8	101·6	106	105·8	104·2	104		,,
66	101·2	101·4	103	103·2	102·4	101·8	102	102		,,
38	100·6	101	101·8	103·4	101·8	101·6	101·8	101·8		,,
87	101·4	101·2	101·6	101·4	105·2	106	104·4	103		,,
72	101·6	101·8	101·6	101·4	104·8	105	104·2	103		,,

SELECTED TABLE III.

Showing that an injection of Tuberculin confers resistance to a second dose administered three weeks later in 33% of cases in tuberculous animals.

III. A.

No. of Cow.	Temp. 24 hrs. before Testing	Temp. at Time.	3rd Hour.	6th Hour.	9th Hour.	12th Hour.	15th Hour.	18th Hour.	Age.	Dose.
78	102·2	101·7	102	102·2	105	104·8	104·4	104·2	5	4 c.c.
89	101	101·8	102·8	102·8	103·6	105·2	104·8	104·4	8	,,
16	101·4	101·8	102	102	103·8	104·2	106	104·8	5	,,
9	101·2	101	101·6	101·8	104	104	106·2	104·6	6	,,
13	101	101	101·8	102·2	105·6	106·2	104·6	103	14	,,
57	101·2	101·6	102	102·2	106·4	106·2	105·8	104·2	6	,,
55	101·2	101·4	101·4	102	105	104·4	104·6	105	4	,,
63	101	101·4	101·6	102·2	104	104·6	104·2	104	10	,,
24	101·4	101·4	102	102	105·6	104·6	104·4	104	7	,,

III. B. Second Testing in Three Weeks Later.

78	102·4	101·4	101·4	101·6	101·8	102·2	102	102		4 c.c.
89	101·4	101·4	101·8	102	102·4	105·2	104·2	104·2		,,
16	101	101·6	102·6	103	103·4	104·2	104·2	104		,,
9	101·6	101·4	103	103	104·6	104·6	103·8	103·6		,,
13	100·8	101	101·6	103	102	102·2	101·8	101·8		,,
57	101·4	101	101·6	104·2	105	106	105·2	103·8		,,
55	101	101·2	101·8	103	104·2	104·6	104·8	103		,,
63	101·8	101·6	101·8	103	101·8	101·6	102	101·8		,,
24	101·6	101·4	102	102·8	104·4	104·8	103·2	102·8		,,

SELECTED TABLE IV.

Showing that an injection of Tuberculin confers no power of resistance to a second dose administered four weeks later in tuberculous animals.

First Testing.

No. of Cow.	Temp. 24 hrs. before Testing	Temp. at Time.	3rd Hour.	6th Hour.	9th Hour.	12th Hour.	15th Hour.	18th Hour.	Age.	Dose.
14	101·4	102	102·2	103·4	106	107·2	106·6	106·2	13	4 c. c.
R 536	101	101·2	101·2	101·8	103	103·2	105·6	103·2	7	,,
26	101·2	101·4	102	102·2	104·2	104·6	103·6	103·2	7	,,
35	100·8	101·4	101·8	102	106·4	106·6	106	105	6	,,
88	101·6	101·2	101·4	101·6	102·8	105·2	106	104·8	8	,,
58	101·4	101·2	101·6	101·8	103	105·8	106·4	103·8	10	,,
47	101·4	101·6	101·6	101·8	103·2	106	106·4	105	10	,,
36	101·2	100	101·6	101·4	102·6	104	104·2	104	11	,,
90	101·4	101·8	101·8	102	103·6	105·4	104·6	104·4	5	,,

Second Testing Four Weeks Later.

14	102	102	102·2	102·2	102·6	103·8	105	104		4 c. c.
R 536	101·6	101·8	102·2	104	104·4	104·8	103·6	103·2		,,
26	101·6	101·8	102	104	104·8	105	104·2	104		,,
35	101·2	101	101·6	102	104·2	104·2	103·8	102·6		,,
88	101·4	101	102	103	104·8	104·6	104	103·2		,,
58	101·6	101·4	101·6	101·8	102·8	103·8	104	103·4		,,
47	100	101·2	101·4	101·4	102·6	105·2	104·4	104·4		,,
36	101·2	101·2	101·4	101·4	103	104·8	104·6	104·4		,,
90	102	101·8	101·6	101·8	102·8	105·6	104·8	103·8		,,

N.B.—A further group of cattle were tested five weeks after getting the initial injection with results similar to above Table.

SELECTED TABLE V.

Showing that the employment of a larger dose of Tuberculin does not increase the period of resistance to an ordinary dose administered four weeks later.

First Testing.

No. of Cow.	Temp. 24 hrs. before Testing	Temp. at Time.	3rd Hour.	6th Hour.	9th Hour.	12th Hour.	15th Hour.	18th Hour.	Age.	Dose.
A 1	101·6	101·4	102	101·8	103·2	105·6	104·8	104·2	3	8 c.c.
2	101·6	101·8	101·4	102	104·6	105	104·6	103·2	3	,,
3	101	101·8	102	102	103·2	106·4	107	106·2	3	,,
4	100·8	102	101·8	101·8	103	105·6	104·8	104·4	3	,,
5	101·4	101·8	102	101·8	103	104·2	104·4	104	3	12 c.c.
6	101·2	101·2	101·6	101·8	102·8	104	105·6	104·2	3	,,
7	101·6	101·8	101·6	102	101·8	103	104·6	104·4	3	,,
8	101·6	101·6	102	101·8	103·6	106·4	106	105·2	3	,,
9	101	101·6	102	101·8	103·2	105·8	105·4	104·8	3	16 c.c.
10	101·2	101·8	101·4	101·8	101·8	104·8	105·2	104	3	,,

Second Testing after Four Weeks.

A 1	101·2	101·8	101·8	103	104·8	104·8	102·8	102·8		4 c.c.
2	101·6	101·4	102·2	103	103·2	105·6	104·6	103·6		,,
3	101	101·2	101·4	101·6	102·6	104·6	104·8	103·8		,,
4	100·8	101·8	102	102	103·6	104·8	104·4	103·8		,,
5	101·4	101·6	101·6	102	103·2	104	104·8	103·8		,,
6	101·8	101·8	103	102·4	103·4	104·2	105·2	104·2		,,
7	101·6	100·6	101	101·4	102·4	103·2	106·2	104·2		,,
8	100·8	101·2	102	103·4	104·4	107·2	106·4	105		,,
9	102	101·6	101·6	101·6	103·6	104·8	104·8	103		,,
10	101·4	101·6	102	102	103	106·2	104·8	104·2		,,

SELECTED TABLE VI.

To be read in conjunction with Table II. To prove that repeated injections of Tuberculin at intervals of 14 days gradually increases the number of animals in the group which will resist further injections.

II. C.

This Table shows the reaction obtained after a third injection after interval of 14 days. After the second injection 50% of animals showed resistance, after third injection 64% showed resistance, after fourth injection 84% showed resistance.

THIRD TESTING.

No. of Cow.	Temp. 24 hrs. before Testing	Temp. at Time.	3rd Hour.	6th Hour.	9th Hour.	12th Hour.	15th Hour.	18th Hour.	Age.	Dose.
59	101·4	101·4	102·8	103	104·4	104·8	105	103·6	10	4 c.c.
51	101·6	101·8	101·4	101·8	102·2	101·6	101·4	101·8	5	,,
84	100·8	100·8	102	102·4	104	104·8	104·8	103·8	4	,,
31	101·2	101·4	101·8	101·6	102	102	101·8	101·8	4	,,
17	101·8	102	102·8	102·8	103·4	104·8	102·8	102·8	4	,,
25	101·4	101·4	101·4	101·8	102	102	101·8	101·8	4	,,
33	101·6	101·2	101·8	101·8	101·8	101·6	101·6	101·6	4	,,
69	101·8	101·8	102·8	103	104·2	106·2	105·4	104·6	5	,,
70	102	101·2	101·6	102	101·8	101·8	102	101·8	5	,,
41	101·4	101·6	102·2	102	102·2	102·4	102	102·2	8	,,
66	101·8	101·8	101·2	102	101·2	102	101·8	101·8	7	,,
38	100·8	101·2	101·6	101·6	101·8	101·8	102·2	101·6	10	,,
87	101·2	101·4	102	102	101·8	102	102	101·8	8	,,
72	101·6	101·4	102	102·6	104·8	105·2	104·6	104	4	,,

TABLE VI.—(*Continued*).

III. D. FOURTH TESTING.

No. of Cow.	Temp. 24 hrs. before Testing	Temp. at Time.	3rd Hour.	6th Hour.	9th Hour.	12th Hour.	15th Hour.	18th Hour.	Age.	Dose.
59	101·4	101·6	102·2	103·6	104	104·4	104·6	103·2	10	4 c.c.
51	101	100·4	101·8	101·8	102	102·2	102	102·6	5	,,
84	101·6	101·6	101·6	101·4	101·6	102	101·8	101·8	4	,,
31	101·2	101·8	101·8	101·8	101·8	102	102	101·8	4	,,
17	101·2	100·4	101	101·2	101·2	101·4	101·4	101·4	4	,,
25	101·8	101·6	101·6	102	102	102	102	102·2	4	,,
33	102	101·4	101·4	101·6	101·4	101·6	101·6	102	4	,,
69	101·6	101·6	102·2	101·8	102	102	102·2	101·8	5	,,
70	100·2	100·8	101	101·2	101·2	101·8	102·2	102·2	5	,,
41	101·4	101·2	101	101	101	101·6	101·4	101·4	8	,,
66	101·2	101·4	101·4	101·6	101·6	101·4	102·2	102	7	,,
38	101·6	101·4	101·6	101·4	101·8	101·6	101·4	101·4	10	,,
87	100·8	101	101·8	102	102	102	102	101·6	8	,,
72	101·6	101·4	102	103	104·8	105·2	106	104·2	4	,,

TABLE VII.

To be read in conjunction with TABLE III.

To show that a third injection of Tuberculin administered at intervals of three weeks increases the number of animals showing resistance. After second testing at interval of three weeks 33% showed resistance. After third testing 66⅓% showed resistance.

III.C. THIRD TESTING.

No. of Cow..	Temp. 24 hrs. before Testing	Temp. at Time.	3rd Hour.	6th Hour.	9th Hour.	12th Hour.	15th Hour.	18th Hour.	Age.	Dose.
78	101·6	101·6	101·6	101·8	102	102	101·8	101·8	5	4 c.c.
89	101·4	101	101·4	101·6	101·8	102	102	101·8	8	,,
16	101·4	101·4	102·2	103	104	105·4	104·4	104	5	,,
9	101·2	101·4	101·6	102	101·8	101·8	101·6	101·6	6	,,
13	100·8	101	102	101·6	101·8	102	102	102	14	,,
57	101·6	101·4	101·6	101·6	103·8	105·4	104·6	104·2	6	,,
55	102	101·2	101·4	101·4	101·6	101·6	101·6	101·4	4	,,
63	102	101·8	101·8	101·8	102	102	102	102·2	10	,,
24	101·8	101·6	102	102·2	104·6	106·4	105·6	104·2	7	,,

TABLE VII.

To show that one application of the ophthalmic test does not confer the power of resistance to further tests at intervals of one week in animals known to be tubercular.

No. of Cow.	Result of Ophthalmic Test.
B1	Lachrymation and congestion within 8 hours—opaque discharge later.
2	,, ,, ,, within 6 hours
3	,, ,, ,, ,, 6 ,,
4	,, ,, ,, ,, 6 ,,
5	,, ,, ,, ,, 12 ,,
6	,, ,, ,, ,, 8 ,,
7	,, ,, ,, ,, 6 ,,
8	,, ,, ,, ,, 6 ,,
9	,, ,, ,, ,, 8 ,,
10	,, ,, ,, ,, 8 ,,

Second Testing.

B1	Lachrymation and congestion within 6 hours—opaque discharge afterwards.
2	,, ,, ,, within 12 hours
3	,, ,, ,, ,, 8 ,,
4	,, ,, ,, ,, 8 ,,
5	,, ,, ,, ,, 6 ,,
6	,, ,, ,, ,, 6 ,,
7	,, ,, ,, ,, 8 ,,
8	,, ,, ,, ,, 10 ,,
9	,, ,, ,, ,, 12 ,,
10	,, ,, ,, ,, 12 ,,

TABLE VIII.

To show that one application of the ophthalmic test does not confer the power of resistance to further tests after an interval of one week even when the subcutaneous test is applied at the same time.

First Testing.

No. of Cow.	Temp 24 hrs. before Test	Temp. at Time.	9th Hour.	12th Hour.	15th Hour.	18th Hour.	Age.	Dose.	Ey Test.
C 1	101·2	101·6	102	103·6	106·8	105·4	4	4c.c.	Positive
2	101·6	101·8	102·6	104·8	107	106·2	..	..	,,
3	101·4	101·4	101·8	103·2	104·6	104·4	..	..	,,
4	100·8	101·6	101·8	102·8	104	104	..	..	,,
5	101	101	103	105·4	105	104·6	..	..	,,
6	101·4	101·6	102·2	104·2	104·8	103·2	..	..	,,
7	102	102	102·6	104·8	105·2	105	..	..	,,
8	101·8	101·2	102·4	103·8	104	104·8	..	..	,,
9	101·4	101·4	102	103·6	104·4	104·2	..	..	,,
10	100·8	101	101·8	103·4	105	104·2	..	..	,,

Second Testing.

C 1	101·8	101·6	102	102·2	101·8	102	,,	,,	Positive
2	101·4	101·6	101·6	101·6	101·6	101·8	..	,,	,,
3	101·4	101·8	102	102·6	102·4	102	..	..	..
4	102	101·4	102·6	103	102·2	102·2	..	..	,,
5	101·6	101·6	101·6	101·6	101·6	101·8	..	,,	,,
6	102	101·8	101·8	102	101·8	101·8	..	..	,,
7	100·8	101·4	101·4	101·8	102	102	,,	,,	,,
8	101·8	101·6	101·6	101·8	101·4	101·6	,,	,,	,,
9	101·4	101·6	101·6	101·8	102	102	,,	,,	,,
10	102	101·8	101·8	101·8	101·8	102	..	,,	,,

The Intradermal test gave precisely similar results to those shown above.

TABLE IX.

Results of thirty-nine post-mortem examinations performed on animals proved by the Tuberculin test to be affected with tuberculosis.

No. of Cow	Result.
59	Extensive lesions of both serous membranes.
42	Lungs only affected—large caseating nodules.
101	Lungs only affected—large caseating nodules.
13	Bronchial glands alone affected.
21	Lungs, pericordium and thoracic glands affected.
73	Both serous membranes affected.
63	Lungs and thoracic glands affected.
53	Lungs, plura and liver affected.
17	Bronchial and oesophageal glands affected.
23	Lungs and thoracic glands affected.
27	Thoracic glands (bronchial and mediastinal) affected.
34	Bronchial glands only affected.
75	Bronchial glands only affected.
76	Bronchial glands only affected.
72	Serous membranes both affected.
74	Bronchial and mediastinal glands affected.
73	Bronchial and mediastinal glands affected.
74	Abdominal organs, peritoneum, and udder affected.
75	Three caseating centres in left lung.
83	Bronchial and mediastinal glands affected.
4	Bronchial and mediastinal glands affected.
5	Both serous membranes affected.
11	Both lungs extensively affected.
19	Lungs affected.
38	Bronchial glands only affected.
39	Bronchial and mediastinal glands affected.
41	Lungs, plura, and thoracic glands affected.
47	Bronchial glands alone affected.
56	Bronchial, mediastinal and oesophageal glands affected.

TABLE IX.—(*Continued*).

91	Both serous membranes affected.
93	Bronchial glands only affected.
117	Both serous membranes, lungs, and abdominal viscera affected.
14	Bronchial and mediastinal glands affected.
123	Bronchial and mediastinal glands affected.
171	Bronchial glands only affected.
46	Lungs and thoracic glands affected.
103	Caseating nodules in both lungs.
151	Miliary tuberculosis.
192	Bronchial glands only affected.
116	Bronchial and mediastinal glands affected.
2	Bronchial and mediastinal glands affected.
107	Lungs and thoracic glands affected.
109	Bronchial glands only affected.

FIRST AID TO THE INJURED AND EMERGENCY NURSING.

By GEORGE FLETCHER, F.G.S., M.R.I.A., *Assistant Secretary in respect of Technical Instruction.*

Immediately on the outbreak of war public opinion in all parts of Ireland was manifested in favour of voluntary effort in First Aid and Ambulance Work. Representations were made to the Department and inquiries made as to the part they could take in this movement.

The teaching of First Aid and Home Nursing was by no means new under the Department's Schemes. For over ten years past the Department had organised courses of instruction in Girls' Secondary Schools in Physiology and Hygiene, which courses included some instruction in the principles of First Aid and Sick Nursing, and they held a number of Summer Courses for the purpose of training Secondary School Teachers as Instructors in this important subject, in which valuable results were obtained. Recognising, moreover, that teaching of the kind was, or should be, an important element in Domestic Economy, they introduced instruction in Hygiene and Sick Nursing into the curriculum of the course of training for teachers of Domestic Economy at their Irish Training School of Domestic Economy at St. Kevin's Park. They also held year by year Summer Courses in this subject for teachers of Domestic Economy already at work in the country in order that they might incorporate sound instruction in the laws of health into their classes in Urban and Rural districts. When later the Women's National Health Association began and extended its valuable work, the Department held special courses of instruction in Hygiene and Sick Nursing for trained district nurses in order that they might teach this subject in the various centres in Ireland in which they were located where the conditions were favourable to such work. These courses were largely availed of, and instruction commenced under local Technical Committees. It will thus be seen that the Department were strongly in favour of instruction of this character in time of peace. The outbreak of war, however, led to a very strong demand for a rapid extension of classes in First Aid and Sick Nursing.

The Department have power under their Programme for Technical Schools and Classes to make attendance grants in the subject, and they immediately drafted a syllabus of instruction to meet the new conditions which had arisen. The Syllabus is divided into three parts—Part I. being concerned with First Aid to the Injured, Part II. with Hygiene and Emergency Nursing, and

Part III. with Ambulance work. In drawing up this Syllabus, and indeed in its subsequent operations, the Department have had the advantage of the advice and generous co-operation of several eminent members of the medical profession. The Department at once defined the sphere of its activities. It was concerned only with instruction, and not with the organisation of Voluntary Aid Detachments, and this position was made clear at the public meeting convened by Her Excellency the Countess of Aberdeen, at the Royal Dublin Society early in August. They recognised that there were already in existence such organisations as the British Red Cross Society, St. John Ambulance Association, St. Patrick's Ambulance Association, the Women's National Health Association, the Irish Volunteer Aid Association, and the Cumann na mBan.

The British Red Cross Society and the St. John Ambulance Association had for many years carried on the noble work for which they were founded, and the other associations named had, later, in a greater or less degree, undertaken work of a similar character. The Department's efforts were so directed as to enable all these, or other associations, to work under their Regulations. What they did was to establish a new standard for work of this character. They had not at first intended to award Certificates of Proficiency as a result of the teaching, but the demand for Certificates given by an independent body became so great that the Department drew up conditions for granting Certificates in Part I. and Part II. of their Syllabus of instruction. They insisted that at least 20 hours' instruction should be received by a candidate for a Certificate, and laid down such conditions for the conduct of the classes and the qualifications of the teachers as to secure as high a degree of efficiency as possible. These conditions were such as to enable the War Office to approve of the Department for the purpose of granting Certificates, and hence the holders of the Department's Certificate of Proficiency in First Aid to the Injured are eligible for enrolment in Men's detachments under the War Office Scheme for the Organisation of Voluntary Aid, and holders of the Certificates of Proficiency in First Aid to the Injured and Hygiene and Emergency Nursing, for enrolment in Women's Detachments. The Certificates were at once recognised by the British Red Cross Society, and subsequently by the St. John Ambulance Association.

It may be added that very complete detailed arrangements were devised in order to secure a uniform standard of examination, and as high a standard as could reasonably be expected in the classes formed. It may be remarked that the Syllabus in Hygiene and Emergency Nursing differs from other syllabuses in common use in that a considerable amount of work in the principles of Hygiene

is required as a preparation for the instruction in Nursing. It was felt that a knowledge of these principles was essential to really adequate instruction in Sick Nursing. There were, happily, available for teaching in this subject a number of trained nurses, who, in addition to having had experience in district nursing, had attended the Department's Special Courses conducted at the Royal College of Science.

The Syllabuses are as follows :—

PART I.—FIRST AID TO THE INJURED.

(a) The general structure of the body—The bony framework—The joints, cartilages and ligaments—The muscles and the muscular system—Tendons—The mechanism of bodily movement.

Dislocation : Symptoms and treatment—Sprains.

Fractures : Varieties, signs, symptoms and treatment.

Practical Work : Use of the triangular bandage—Practice in the application of splints—Transport of injured persons—Hand seats, etc.

(b) General account of the blood-circulatory system—The heart, arteries, veins and capillaries—The mechanics of the circulation—The geography of the principal arteries and veins—Nature of blood—Coagulation and its meaning—The arrest of bleeding—internal and external.

Practical Work : Practice in the methods of arresting bleeding—Use of tourniquets and other methods.

(c) Wounds and their treatment—The nature of septic poisoning—Aseptic and antiseptic treatment—Varieties of wounds—Lacerated and punctured wounds—Bullet wounds—Burns and scalds—Electric shock.

Practical Work : Dressing wounds—The use of the roller bandage—Further practice in the transport of injured persons.

(d) The Brain and spinal cord—The nervous system and its functions—Unconsciousness and its causes—Fainting, apoplexy, epilepsy, sunstroke and their treatment.

Practical Work : Rehearsal of methods of ascertaining and treating states of unconsciousness.

(e) The Excretory organs—The lungs and the mechanism of respiration—Artificial breathing—The structure of the pharynx and larynx—Suffocation and its treatment—The sensory organs—The eye and ear—removal of foreign bodies.

Poisoning : Symptoms and general treatment.

Practical Work : Practice in bandaging—triangular and roller—Stretcher practice—Restoring the apparently drowned—Sylvester's, Schäfer's, Howard's and Laborde's methods.

PART II.—HYGIENE AND EMERGENCY NURSING.

(*a*) A general account of the bodily economy—The functions and relationship of the digestive, excretory, circulatory and nervous systems.

The nutrition of the body : The alimentary canal and digestion Foods and food substances—their relative values. Methods of preparing and cooking various foods—The selection of food—Diseases conveyed by food—Contamination. Beverages and stimulants.

Practical work : Protection of food—Meat inspection—The preparation of food and its cooking.

(*b*) Water and water supplies—Sources of and impurities in water—Collection, storage and distribution of water—Protective precautions—Hard and soft water—Causes of hardness and methods of softening—Diseases caused by impure water—Filtration, boiling, etc.

Practical work : Water—Simple tests for impurities—Filtration, etc.

(*c*) The Excretory Organs.

The lungs and respiration : Breathing in health and in disease—The composition of inspired and expired air—The necessity for and means of securing ventilation in houses and in hospitals.

The kidneys and their function.

The skin and its function—Personal cleanliness.

The blood circulation system—The heart, arteries, veins and capillaries—The pulse—The temperature of the blood.

The brain and nervous system and the part they play in the bodily economy.

Practical work : Examination of air, pure and expired. Practice in taking the pulse and in the use of the clinical thermometer.

(*d*) Personal hygiene—Cleanliness, habits—sleep—Action of skin and bowel.—Fatigue. Use of alcohol—Smoking—Care of teeth—Exercise—Clothing and the properties of clothing materials.

(*e*) Sanitation of Buildings—Site and elevation—Aspect—Drainage—Heating, lighting and ventilation—Removal of refuse—Water closets, latrines, etc.

(*f*) The causation and prevention of disease—Diseases caused by germs—The modes of entrance of germs into the body, and their action in the body.

Infectious diseases—How infection is transmitted—Stages of infectious fevers—Periods of exposure, incubation and invasion—Tuberculosis and its treatment.

(*g*) The duties of the nurse—The sick room and its management—Beds and bedding—Position of bed—Fracture bed—Steam tent.

Treatment of the patient—Feeding, washing, changing nightclothes—Invalid diets and drinks—Medicines and their administration—Bed-making, etc.—Disinfectants and disinfection—Types of fever—Baths and bathing.

Practical work: Bed-making, changing sheets, etc.—Demonstration of nursing details—Use of measures—Practice in the use of the roller and other bandages—Surgical dressings. Further practice in the use of the clinical thermometer. The recording of temperatures.

(*h*) The signs and process of inflammation—The application of cold and heat, dry and moist—Fomentations, poulticing, etc.

Practical work: Practice in the use of surgical dressings, bandages, etc.—Nurses' duties in connection with emergency operations.

PART III.—AMBULANCE WORK.

The course covered by the *Training Manual* (No. 3) of the British Red Cross Society should be followed.

The publication of the foregoing Syllabuses, together with extracts from the Department's Regulations showing how the Department's assistance could be secured was followed by the organisation of a large number of classes in all parts of Ireland from Howth to Achill, and Portrush to Valentia. At the time when most of these classes were formed, the Technical schools of the country and officers of local education authorities were on vacation. The Department, therefore, recognised voluntary Committees formed for the management of these classes as an emergency measure. A large amount of organisation was involved in consequence, and no fewer than 304 classes have already been established in Part I.,

and 79 classes in Part II. of the Department's Syllabus. In the city of Dublin alone 90 classes have been held in First Aid, and 21 in Emergency Nursing. Classes everywhere were largely attended; nearly 10,000 students having been enrolled. The examinations are now in progress, and already some 1,500 Certificates have been awarded.

The examinations are in all cases conducted by fully qualified medical practitioners selected from a panel of those who have been willing to co-operate with the Department in this work. It is not anticipated that many classes will be formed in Part III. Eight have been already registered, but this work can best be carried out when Voluntary Aid Detachments are formed. As is well known a large number of Voluntary Aid Detachments have been already formed, and although, as has always been foreseen, only a small proportion of those joining classes would afterwards join Voluntary Aid Detachments, it is certain that the excellent instruction which has been given so widely by medical men and specially trained nurses will be of the utmost value in making better known the laws of health, obedience to which is essential to the health of the community.

The Department will in future require that any further classes formed shall, save in exceptional circumstances, be formed in connection with Technical Instruction Committees of County and Urban authorities, though they will recognise classes in Sick Nursing under Voluntary Committees which have already been conducting classes in First Aid to the Injured.

PRODUCTION AND VALUE OF IRISH TIMBER.

Owing to the European War the prices of many classes of timber have increased considerably, and in certain directions importers are finding a difficulty in obtaining their usual supplies from abroad. This especially applies to timber shipped from some of the Baltic and Russian ports, which have either been closed to the timber trade by seagoing traffic restrictions and the declaration of wood as contraband of war, or near which the usual forest work have been disorganised by military operations. Prices of most kinds of timber have risen in consequence, and British timber will probably find a better market during the next year or two than has been the case for some years.

Acreage under Woods.

As regards Ireland, the supply of native timber for export or home consumption has never been excessive, and it is not anticipated that increased felling to meet temporary emergencies could be carried out without permanently injuring the condition of Irish woodlands. Of the total area of the country, only 1·4 per cent. is under woods, and as this percentage is inclined to decrease rather than increase, the possibility of an extended trade in timber used locally, or exported, is unlikely to occur.

Of the total area of 297,809 acres of Irish woods, 93,640 acres are returned as coniferous, 70,077 as broad-leaved, and 127,092 as mixed conifers and broad-leaved; the balance consisting of scrub, coppice, osier beds, etc. The nett timber producing area is thus 290,909 acres. Hedgerow and park timber add considerably to the total quantity available for home consumption or export, but no figures are available to show the quantities of this class included in the annual returns of Irish timber.

During the ten years 1904 to 1913 inclusive the area under wood, scrub, coppice, &c., throughout Ireland decreased from 303,118 acres to 297,809 acres. During the same period the total number of acres returned as cleared was 14,087, while the total number of acres returned as planted was only 9,746, showing a deficiency of 4,341 acres in the planted area necessary to maintain a permanently stocked acreage of woodland.

This fact is brought out in another way by reviewing the distribution of age classes on the wooded area. These are returned as follows for 1913:—

—	1–25 yrs.	26–50 yrs.	51–75 yrs.	76 yrs. and over.	Various ages.
Coniferous	13,731	24,651	15,365	13,503	26,390
Broad-leaved	1,993	8,375	11,091	20,881	27,737
Mixed	4,446	12,241	13,900	23,729	72,776
	20,170	45,267	40,356	58,113	126,903

The deficiency in woods under 26 years of age reveals the fact that planting has fallen seriously behind during the last quarter of a century, and indicates that a shortage of timber must occur within the next forty or fifty years if the present consumption is maintained. The large preponderance of woods over 76 years of age might be interpreted in two ways, one suggesting that a large stock of mature or over-mature timber is present in the country, and the other that the bulk of the woodland is worn out and neglected. Unfortunately there is little doubt that the latter is the case, and that a large area is in need of being cleared of scrub and scattered trees and replanted with new crops.

In the woods of various ages a certain proportion of young timber may be present to carry on a succession, but this cannot be relied upon to make good the deficiency from even aged woods, from which the bulk of commercial timber must be drawn.

Felling.

Turning to the tables showing the number of trees disposed of in 1904 and 1913, respectively, it is found that 777,697 trees were felled in the former, and 571,859 trees in the latter year—a reduction of 27 per cent. To some extent the relatively large number returned in 1904 may have been due to the severe storm of the previous year, which blew down thousands of trees throughout the central part of Ireland, many of which were not cleared off the ground or disposed of until the following year. Apart from this, however, it is evident that the supplies of Irish timber, as well as the area under wood, tend to decrease rather than increase, whatever figures may be examined.

The estimated weight of all timber felled in the country in 1913 was 245,210 tons, which, in view of the difficulties in obtaining accurate returns, can only be considered approximate. As the average yield per annum of a well-managed plantation should be from one to two tons of green wood to the acre, it would not appear from statistics alone that Irish woods are being over-cut to any great extent. But a careful examination reveals the fact that extremely few woods in the country can be considered as normally stocked, and it is doubtful if an average of more than 50 per cent. of a full crop can be found over the entire area returned as wood-

land. This brings out the fact that clearing and replanting must at least balance each other for some years to come if the present output of timber is to be permanently maintained, and, as already pointed out, this is not the case. It may be noted, however, that the returns during the last year show a relative increase in the rate of planting over felling, and this is satisfactory.

Home Uses of Timber.

Before any encouragement can be given to an increased export of timber, assuming such to be possible, the supply needed by industries using home-grown wood should be provided for. At present this supply is chiefly needed for railway sleepers, building purposes, agricultural implements, and box-making. These four industries consumed about 128,000 trees of the total number felled in 1913, or about one-fourth. It may be assumed, however, that these trees were well above the average weight of the total number felled, and represented at least half of the total tonnage of 245,210 tons, leaving 120,000 tons as available for export. This estimate agrees very closely with the actual quantity returned as exported, namely, 119,483 tons of rough and sawn timber and pitwood, so that on statistics alone it is not possible to say that the interests of home manufactures are suffering by exports of timber, unless, as may possibly be the case, that timber is being worked out at a faster rate than it is produced.

Exports of Timber and Pitwood.

The exports of Irish timber to Great Britain during the five years 1909 to 1913 were as follows:—

		Loads.	*Annual Average. Loads.*
Rough timber	..	521,351	104,270
Sawn ,,	..	29,615	5,923
Pitwood	..	97,090	19,418
			129,611

The greater part of this timber was exported from the ports of Belfast, Cork, Dublin, Waterford, Limerick, Wicklow, and Wexford, and a large proportion of the rough timber probably went into mines, over three-fourths of the total quantity being delivered at Garston and Cardiff.

Taking the figures for exported timber in numerical order, it is found that 304,214 out of a total of 571,859 trees were used for mining purposes in 1913, practically the whole of which was exported. These exports were mainly obtained from the counties of Wicklow, Wexford, Waterford, Cork, and Tipperary, from which

280,007 trees of the total number were derived. In these five counties 95,229 acres were returned as woodland, practically one-third of the total wooded area of Ireland. Of these 95,229 acres, 41,220 are given as coniferous, 31,993 as mixed, and 22,016 acres as broad-leaved woodland, the two classes first named representing 33 per cent. of the total of those classes in Ireland. The areas planted and felled in the year 1913 were 567 and 886 acres, respectively, showing that the clear fellings extended over more than 9 per cent. of the total woodland, while an examination of the woods brings out the fact that the stock of timber on the uncleared portion is much below what it should be. In this one item of pitwood, therefore, exports must be considered in excess of the normal quantity capable of being produced for any length of time in these five counties.

The species of trees exported for mining purposes are chiefly larch, Scots pine, spruce, and miscellaneous species, such as silver fir, oak, and several others. Of these, larch constitutes nearly three-fourths of the total export, and is the only mining timber which can bear an expensive railway carriage from inland districts. The bulk of the Scots pine, spruce, etc., exported as mining wood is shipped from the south-eastern ports of Cork, Dungarvan, Waterford, Wexford, and Wicklow, and is grown within a short distance of these ports.

Larch.

So far as larch alone is concerned, it is probable that no other market than that found in the British colliery districts could consume more than a small quantity, and it is difficult to prove that exports of Irish larch are prejudicial to the home timber industries, provided that sufficient is available for fencing, gates, and agricultural implements, for which it is chiefly used in the home trade. From the grower's point of view the benefits derived from the export of larch timber depend upon the price given by the timber merchant, who acts as shipper or purveyor to the collieries in Wales and England. The prices prevailing during the last few years for larch in the south-east of Ireland varied from 10*s.* to 20*s.* per ton in the wood, equal to a price of 4*d.* to 8*d.* per cubic foot. Prices appear to decrease in the neighbourhood of the ports from which the Welsh colliery timber is shipped, partly due to the fact that the South Wales coal fields value larch little if at all higher than French pitwood—consisting of maritime pine—while it fetches a much lower price than spruce or Scots pine pit props imported from the Baltic. A great deal of the larch timber shipped into Wales from the South of Ireland is also of smaller average size than that going into Lancashire, Scotland, etc., and this partly accounts for the lower prices.

The rate of growth of larch on fairly good ground throughout

Ireland may be estimated at 50 to 60 cubic feet per acre per annum, assuming that the crop is grown pure; is planted at 4 feet apart; and is only thinned during the first 15 or 20 years to ensure the healthy development of the best trees. In rotations of 35 years crops of larch in County Waterford are said to have produced an average of 100 cubic feet per acre per annum, equal to about three tons of green wood, and valued at 10*s.* to 12*s.* per ton. At this rate of growth larch must naturally be considered a paying crop, but it is very seldom that more than 50 to 60 cubic feet, or two tons of green timber can be reckoned upon annually. The cost of growing a crop of this kind, assuming that no exceptional difficulty in the way of planting is met with, might be put at 15*s.* per acre per annum, which would cover rent of land, costs of planting, protection, and management, with interest on capital outlay not exceeding 3 per cent. With a 40 years' rotation, this would represent about £30 as the total cost of production, against which a crop of 80 tons per acre might possibly be obtained on a favourably situated site. This leaves a balance of £10 to £30 per acre, according to the prices obtained for the timber, which usually increase with the average size of the trees up to certain limits. In a general way any ground suitable for larch growing should show a substantial profit if planted with that tree in districts in which 6*d.* per cubic foot can be obtained in the wood, and 1½ tons of timber produced annually on a 40 to 60 years' rotation. On mountain slopes, with shallow soils, rotations of 40 to 50 years can seldom be advantageously exceeded, as the rate of growth not only falls off rapidly after that age, but heart rot frequently appears, and the quality of the timber deteriorates. On deeper soils, rotations of 60 years or more may be adopted.

The chief difficulty in estimating returns from larch planting is the possibility of disease affecting the crop at an early age. When this is the case, it is quite possible that the trees may never reach a marketable size, and nothing may then remain but to clear off the crop of stunted poles, and sell them at whatever they may fetch locally. Fortunately, the danger of larch disease is very slight in the south-eastern parts of Ireland, especially when the tree is planted on the drier slopes, and proper attention paid to thinning it in the early stages.

Scots Pine and Spruce.

The returns that may be expected from Scots pine and spruce when grown for pitwood are not nearly so favourable. Not only is the rate of these species slower during the first forty years, averaging on favourable situations about 1½ tons per acre per annum, but the price obtainable for pitwood purposes is not more than two-thirds that prevailing for larch. The prices of pitwood in the

South Wales colliery districts are chiefly regulated by the imports of French wood from the Bordeaux and Bayonne districts. The average price of this wood during normal trade conditions, imported chiefly in the form of props, is said to be about 21*s*. or 22*s*. per ton, delivered at Cardiff. To compete with French wood, Irish timber must be delivered at Cardiff at as low or even a lower price, and it is only when comparative scarcity occurs once or twice a year that a price of more than 17*s*. or 18*s*. per ton can be anticipated. To deliver this wood at Cardiff costs on an average from 10*s*. to 12*s*. per ton, assuming that the costs of carting from the wood to the nearest port average 5*s*. per ton ; freights, 5*s*. per ton ; felling and other costs, at least 2*s*. per ton. From this it appears that not more than 5*s*. to 6*s*. per ton can be paid for pitwood grown within a few miles of a shipping port ; while if railway rates are involved the cost increases to such an extent that the grower can only receive a nominal sum for his timber if he sells for pitwood only. Spruce is even a worse market than Scots pine, and being lighter in weight, works out more unfavourably than the latter. At ordinary prices, therefore, it is evident that the grower cannot possibly receive a price for pitwood made up of these two species which will compensate him for the costs of production, and the various incidental expenses connected with the upkeep of woods.

Another disadvantage in growing Scots pine and spruce for pitwood on short rotations of forty years or so, lies in the fact that the trees are usually making their most rapid growth about that period. While the current annual increments per acre in Scots fir crops on soils of the very best quality in Germany are estimated at 100 cubic feet per acre per annum at 30 years of age, they are put at 133 cubic feet at 40 ; 128 cubic feet at 50 ; and 110 cubic feet at 60 years of age. If inferior localities are considered, the maximum annual increment occurs still later, and the loss from early fellings increases. At 40 years they are, therefore, commencing to put on their maximum annual increment of wood, and by growing and clear felling crops on a 40 year rotation the greater part of this increment is lost.

On the whole, therefore, it may be concluded that larch is the only tree which gives an adequate return when grown purely for pitwood purposes, and cut when the trees average from 9 in. to 12 in. at breast height. In the case of other species, thinnings, damaged trees, and scrub may sometimes be advantageously disposed of as pitwood, but the quantities obtained in this way on average estates are usually too small to tempt a timber merchant to deal with them. Scrub oak is probably the only species, other than larch, which can be usefully sold at pitwood prices in ordinary times, and this chiefly because no other market can be found for it, and the price obtained in the wood rarely exceeds 7*s*. 6*d*. per ton of 24 cubic feet.

For sleepers, box-making, and building purposes, Scots pine and spruce, when grown as pure crops, can be most readily sold at from 60 to 80 years of age. At this age they should average on good soils from 18 in. to 24 in. diameter at breast height, and yields of 80 or 100 tons of green wood per acre can be obtained. For these purposes, timber is usually sawn up in or near the wood, and waste, bark, and other useless parts of the tree, on which carriage would have to be paid in the case of round timber, are left behind. At the present time, several of the Irish railway companies are enquiring for home-grown sleepers and logs, and the prices paid are at least 50 per cent. higher than those offered 10 or 12 years ago. At 4*s.* per sleeper, the price recently offered for Scots pine, spruce, or silver fir, the price per cubic foot would be about 1*s.* 2*d.* to 1*s.* 4*d.*, equal to 14*s.* to 20*s.* per ton for the standing timber, after allowing for the reduction in volume and price on account of waste and sawing. This figure may be reduced by the cost of carriage from the mill to the railway, but as this should rarely exceed 5*s.* per ton of sleepers, the balance in favour of growing the larger wood as compared with pitwood sizes is considerable.

Boxes and Packing Cases.

The use of Irish timber for egg boxes, packing cases, etc., is increasing annually, especially in the North and West. For these purposes, Scots pine, spruce and silver fir are preferred, as they can be more easily handled and nailed without splitting than hardwood timber, and because they are also lighter and more quickly seasoned. Poplar is also largely used for boxwood, where it can be obtained in quantity. Where these species are scarce, oak, ash, beech, and various other woods are used for the rougher kinds of boxes, but, owing to their weight, egg packers do not encourage their use, while in an unseasoned condition the wood is apt to cause the straw in which the eggs are packed to become mouldy. Timber for box-making is usually worth from 8*s.* to 12*s.* per ton in the wood, according to situation, and in localities with a mill working constantly most kinds of timber can be disposed of.

Building and Implements.

Timber for building purposes in country districts is greatly in demand for rafters, joists, posts, lintels, sheeting, and rough flooring boards, and good prices can easily be obtained for Scots pine and spruce suitable for these purposes. For fairly clean and sound timber from 15*s.* to 20*s.* per ton in the wood might be expected, if purchasers are allowed to select the best trees, and as these are frequently bought by farmers, who cart them to the nearest sawmill, this method of selling the timber turns

out more profitable than when larger quantities are sold to a merchant. One objection to selling in this way is that the inferior trees are finally left on the grower's hands, and unless a demand for firewood exists, have often to be sacrificed or sold at a nominal price. Carts and agricultural implements consume a limited quantity of oak, ash, elm, and larch, and for selected wood high prices may be obtained.

Minor Uses.

Amongst minor uses for Irish timber may be mentioned clog making, bobbins, butter and apple barrels, telegraph poles, match making, etc. For clog making alder was originally used, and is so still to some extent, but birch and beech are being used in increasing quantities. Clog blocks are usually worked up on the ground, and finished off after exportation to England. For suitable wood, 4*d*. to 6*d*. per cubic foot may be obtained—equal to 10*s*. to 15*s*. per ton—the usual method being for the block maker, or clogger, to buy trees suitable for his purpose at so much a piece.

Bobbins are usually made from beech, birch, or sycamore timber, and sawn up into convenient sizes or exported in the round. Prices for good, clean timber vary from 5*s*. to 10*s*. per ton, according to locality, but rough timber is frequently sold at very low prices.

For butter barrels or kiels, beech is generally used, and as staves can be manufactured from short lengths, the clean parts of a tree can be selected and sold at from 10*s*. to 15*s*. per ton, delivered on rail.

Hitherto, little Irish timber has been used for telegraph poles, which are usually obtained from Swedish or Russian timber, and creosoted at the ports of delivery. The Controller of His Majesty's Post Office is anxious to obtain home grown supplies of these poles, if possible, and is considering the possibility of inspecting suitable timber in the wood, the seller subsequently barking and delivering the poles at the nearest receiving centre. These poles must be either larch or Scots pine, and are chiefly required in lengths of from 22 to 40 feet, with diameters at the top end of from 5 in. to 10 in., varying with the length of the pole. The poles must be absolutely sound, clean, and straight, and a small number only can be expected to meet the requirements of the authorities in any particular wood. Trees grown closely in sheltered situations are most likely to prove suitable, but on exposed ground the curve at the base of the trees usually disqualifies them for telegraph poles.

A small quantity of Irish timber is needed for match making in Dublin and Belfast. The timber usually used is poplar, of 10 to 18 inches diameter, the aspen variety being imported from Russia in ordinary times, but owing to the war supplies have now ceased, and Irish timber may have to take its place. Clean lengths of

poplar, lime, horse-chestnut, willow, or Scots pine have proved suitable for matches, but freedom from knots is essential, and the demand can be but a limited one.

In several centres the manufacturer of furniture uses oak, ash, sycamore, and beech in varying quantities, and for timber of good quality high prices may be given. Any timber, in fact, which is straight, clean, and from 2 to 3 feet in diameter at breast height should be worth from 10*s*. to 25*s*. per ton, according to species and situation, in ordinary times, and in the event of prices being increased owing to the shortage of supplies from abroad these figures may be raised by at least 50 per cent. So many factors come into operation in a timber transaction, however, that it would be unsafe to assume that any particular wood or estate could command specific prices for any timber, and the prices above named must be regarded as approximate averages throughout the whole country, this article being merely intended to indicate the present position of the Irish timber trade from the growers' point of view.

Basket Making.

Another class of raw material affected by the present war is that used by basket makers, namely, osiers or willow rods. Imports from Holland, Belgium, and Germany having practically ceased, the Irish basket maker is thrown back upon Irish or English rods, and this source of supply is quite inadequate to meet the demand.

As it may be several years before the trade resumes a normal condition, it is probable that Irish farmers and land owners would find osier growing a profitable source of income, if confined to damp, low-lying parts of the farm or estate, which cannot be cultivated or used for meadowing.

As an osier bed can be brought into full bearing in three or four years from the time of planting, a quick return is obtainable. Unfortunately, many osier beds throughout Ireland have been greatly neglected, and the output of rods from the present acreage is not only less than half what it should be, but the quality of the rods produced is so low that basket-makers frequently prefer to pay the higher price for the imported rods than to depend upon Irish supplies.

With proper care and attention, and the use of suitable species there is no reason why an osier bed should not yield an annual profit of from £5 to £10 per acre, according to the quality of the land and nearness to a market. The initial cost of laying down a bed may run from £10 to £20 per acre, but as a large proportion of this is labour, the direct outlay needed by a farmer who can spare a few days from time to time during the year is not great, and there is no doubt that the soils and climate of Ireland are admirably adapted for the extension of this industry, particularly in districts in which wet or swampy land prevails.

A. C. FORBES.

THE BOOM IN FLAX.

Record Prices.

To say that the Flax market is excited would be to describe the existing state of affairs very mildly. All records have been broken. Not even during the American Civil War—the period which is always referred to as the zenith of prosperity—has flax realised so high a price as it is being sold at to-day. This season's Irish crop is being bought in the local markets at prices ranging from 11*s*. to 19*s*. per stone (14 lbs.), and the bulk of it is no doubt bringing the farmers an average price of about 14*s*. per stone, or an advance over prices in normal times of fully 100 per cent.

The following examples of prices which have been obtained by Irish flax growers for their crop of 1914, have come under the writer's notice :—

—	Seed sown.	Acres statute.			Yield of scutched Flax.		Price.		Total value.			Price per statute acre.		
	Pecks	a.	r.	p.	Sts.	lbs.	Per stone *s*.	*d*.	£	*s*.	*d*.	£	*s*.	*d*.
1	14	1	3	29	120	0	17	6	105	0	0	54	7	4
2	30	4	0	20	228	0	18	9	213	15	0	51	16	4
3	12	1	2	34	91	0	19	0	86	9	0	50	9	7
4	11	1	2	0	79	0	19	0½	75	4	3	50	2	10
5	15	2	0	22	119	7	17	6	104	11	3	48	18	4
6	7	1	0	0	62	2	15	6	48	3	2	48	3	2
7	14	1	3	10	96	0	18	0	86	8	0	47	13	4
8	7	1	0	0	56	0	17	0	47	12	0	47	12	0
9	14	2	1	0	122	0	17	0	103	14	0	46	1	9
10	11	1	2	0	80	0	17	3	69	0	0	46	0	0
11	20	2	3	17	150	0	17	0	127	10	0	44	12	9
12	18	2	2	11	120	0	18	9	112	10	0	43	15	10
13	25	4	2	0	216	0	18	0	194	8	0	43	4	0
14	15½	2	0	34	102	0	18	6½	94	11	3	42	14	9
15	14	2	1	0	118	7	16	0	94	16	0	42	2	8
16	8	1	0	22	61	1	15	6	47	6	7	41	12	1
17	6	1	0	0	46	0	18	0	41	8	0	41	8	0
18	42	6	0	0	268	0	18	6	247	18	0	41	6	4
19	84	11	2	0	500	0	18	9	468	15	0	40	15	2
20	10	1	2	0	63	7	19	0	60	6	6	40	4	4
21	14	2	0	0	86	0	18	0	77	8	0	38	14	0
22	26	3	0	0	128	0	17	9¾	114	0	0	38	0	0
23	14	2	0	0	82	6	18	3	75	4	3	37	12	1
24	28	4	3	20	224	12	16	3	182	13	11	37	9	6
25	28	4	3	12	199	6	18	1½	180	14	7	37	9	1
26	12	1	2	34	75	0	17	0	63	15	0	37	4	6
27	17	3	1	0	140	2	17	0	119	2	5	36	13	0
28	8	1	0	22	53	9	15	6	41	11	5	36	10	10
29	14	2	0	0	87	0	16	9	72	17	3	36	8	7
30	42	6	0	0	240	0	18	1½	217	10	0	36	5	0

In order to arrive at the acreage sown, it has been found necessary in some instances to estimate the sowing on the basis of seven pecks to the statute acre. Further, while the yield of scutched flax has

been given mostly from the Scutch-Mill weights, there should be little, if any, difference between these and the Market weights. All prices are given per stone.

Small Crop, 1914.

With such high prices it is much to be regretted that the area sown under flax in 1914 was only 49,253 acres, a decrease of 10,052 acres, or 16·9 per cent. compared with the 59,305 acres in 1913. A further adverse feature is the poor yield of the 1914 crop, and it is to be feared that the yield of scutched flax will be under the average. The crop will, therefore, in all probability, be a small one.

Flax Season, 1915.

That prospects seem to be considered very bright for the coming season's sowing, would appear to be indicated by the prices that are being paid for renting land suitable for sowing flax in 1915. The price ruling in one district being £7 per statute acre, and the writer knows of an instance of land fetching by auction £7 15*s.*, which, with auction fees, brings the total cost up to £8 2*s.* 9*d.* per acre. The extent of the sowing for 1915 will be determined by the amount of seed obtainable.

Flax Seed for 1915.

Flax-seed for sowing purposes is obtained exclusively from Russia and Holland. The following table gives the importation of flax-seed for last season, and for the present season up to date of writing.

FLAX-SEED FOR SOWING PURPOSES, IMPORTED INTO IRELAND.

Season.	From Russia.	From Holland.	Total.
	Bags	Bags	Bags
1913–1914	14,133	12,060	26,193
1914–1915*	—	14,800	14,800
		Decrease 43·4%	

* Up to Middle of December.

NOTE.—A "Bag" of Flax seed contains 14 pecks, which is about the average amount of seed required to sow 2 statute acres.

It has not been possible up to the present to import any Russian seed, and while an increased amount has been imported this season from Holland, it is greatly to be feared that there is little prospect of any further considerable shipments.

The Dutch Government, being anxious to retain sufficient seed in Holland for the 1915 sowing, placed an embargo on the export of flax-seed, which was removed a little later, on representations being made by this country, but in December export was again prohibited. It would appear that the Dutch, like ourselves, are unable to obtain their usual supply of seed from Russia, and they have, consequently, to rely on their own seed for the 1915 sowing in Holland.

No doubt there is a limited amount of seed suitable for sowing purposes left over from last season, and the outbreak of hostilities occurring just prior to the harvesting of the 1914 crop, a number of Irish flax growers, following the advice given to them, saved their own seed. This will slightly help the supply of seed, but no appreciable increase can be relied on, as the supplies from these sources are extremely limited.

High price of Flax seed.

One result of the difficulty in obtaining flax-seed this season is that the price has advanced to a very high figure. It is said that as much as £5 10*s.* per bag has been realised in place of the normal price of 35*s.* to 40*s.* per bag.

Importation of Flax and Tow.

The following tables give the Board of Trade returns of importation for the years 1911, 1912, and 1913, and show how largely the linen industry has to depend on foreign countries for its supply of flax:—

IMPORTATIONS INTO UNITED KINGDOM OF FLAX, AND TOW, OR CODILLA.

	QUANTITIES.					
	1911.		1912.		1913.	
FLAX.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
From Russia .	47,623		68,453		68,161	
„ Netherlands .	1,828		1,927		1,442	
„ Belgium .	12,130		16,205		14,194	
„ Other Countries	730		493		473	
		62,311		87,078		84,270
Tow						
From Russia .	11,758		12,366		13,416	
„ Belgium .	4,786		5,465		3,812	
„ Other Countries	1,174		1,021		955	
		17,718		18,852		18,183
Total .		80,029		105,930		102,453

	Value					
	1911.		1912.		1913.	
Flax.	£	£	£	£	£	£
From Russia .	2,076,777		2,777,911		2,806,829	
„ Netherlands .	121,135		120,973		87,059	
„ Belgium .	1,053,964		1,421,529		1,262,141	
„ Other Countries	31,179		28,182		24,100	
		3,283,055		4,348,595		4,180,129
Tow						
From Russia .	388,874		415,990		503,160	
„ Belgium .	92,503		102,150		65,335	
„ Other Countries	28,828		26,009		22,595	
		510,205		544,149		591,090
Total .		£3,793,260		£4,892,744		£4,771,219

Decreased Importations.

Shipments of both flax and yarns, principally from Belgium and the North of France, were rushed through up to the middle of October, which kept the supply well up to the average quantity. A great falling-off has since been apparent, the decrease in flax and yarns, respectively, arriving in Belfast, amounts to 64·6 per cent. and 64·3 per cent. when compared with the corresponding period of 1913.

Flax and Yarns, Imported into Belfast.

1914.			1913.		
Week ending	Flax.	Linen Yarns.		Flax.	Linen Yarns.
	Tons	Tons		Tons	Tons
29th October, 1914	73	50	Corresponding Week	271	179
5th November, „	3	124	„ „	123	205
12th „ „	190	75	„ „	179	188
19th „ „	166	50	„ „	651	129
26th „ „	35	85	„ „	342	128
3rd December, „	233	39	„ „	364	167
10th „ „	8	30	„ „	246	198
17th „ „	164	35	„ „	288	172
Total .	872	488	Total .	2,464	1,366
Decrease	64.6%	64.3%			

Yarn Prices.

The high price of flax, together with the limited supplies forthcoming have had a very serious effect on the price of yarns. In the heavier counts, which are principally required for the large Government contracts placed recently, the advance in price is most marked.

PRICE OF TOW YARNS.

	Wefts. Nos. 16	18	20	22	25	30	35	40	45	50
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
25th July, 1914	9 4½	8 4½	7 9	7 1½	6 7½	6 1½	5 7½	5 1½	4 10½	4 9
19th Dec., 1914	15 6	14 6	13 6	12 6	11 4½	9 6	9 0	8 6	8 0	7 3

The lighter and finer counts of yarns have not advanced in price to the same extent, the demand apparently concentrating on the heavier qualities.

Crisis in Linen Trade.

The linen manufacturing industry has now to face the most serious crisis in its history, brought about by the stoppage of supplies of flax from Continental countries as a result of the present war. Unless arrangements can be made at once for bringing in supplies of flax from Russia, very serious stoppage of machinery must result to the mills and factories in the North of Ireland.

I have to express my thanks for the valuable assistance I have received from the following:—Mr. H. C. Smith, *The Linen Trade Circular*, Mr. John Adair, Cookstown; Mr. D. Walker-Martin, Armagh; the numerous scutch-mill owners who furnished me with statistics, and the following members of Department's Advisory Committee on Flax, Messrs. A. T. Clark, P. Kelly, James Stewart, John W. Stewart, and W. Warnock.

A. L. CLARK.

MANUFACTURE OF SYNTHETIC DYES AND THE WAR.

By George Fletcher, F.G.S., M.R.I.A, *Assistant Secretary in respect of Technical Instruction.*

Introductory.

For many years past the question of the manufacture of aniline dyes has forced itself on the attention of Chemists and Educationists, and it is significant that it has, speaking generally, been neglected by those more directly concerned—the consumers. To the former class it seemed a reproach that an industry founded upon British scientific discovery, and largely employing raw materials imported from Britain should have passed from British hands and become a German monopoly. Arguments and explanations which served as opiates in the case of other industries in which Germany had competed successfully with British trade failed entirely when applied to the manufacture of artificial dyes. It was undeniable that we possessed the scientific skill—the inventiveness—necessary, the records of our Chemical Journals bear proof of that, and it was also clear that we had at hand the raw materials for such an industry and a large home market for its products. Why then did it pass from our hands ? An impartial analysis of the matter shows that it was due to superior organisation, to a finer spirit of adventure, and to a more business-like application to industrial ends of the teachings of theoretical chemists. It must not be forgotten in palliation of this that we still retain the "initiative" in the production of "heavy" chemicals, and that Germany was, after the federation of the German States, bound to develop industry in certain directions—the particular development under review, however, demands special consideration. It has been common to attribute the success of Germany in this matter to her highly organised system of technical education. This is in a sense true, but it would be more correct to attribute it to the greater readiness of her industrial leaders to employ, to pay for, and to act upon the teaching of her scientific men. One of the outstanding features of the great manufacturing concerns with which we are dealing is the number of trained chemists they employ, not, be it observed, for the routine work of chemical analysis, but to investigate and follow up any line of inquiry which may appear to lead to useful results. An example of this is to be found in the notable triumph of the German chemical industry in the production of Synthetic Indigo from Naphthaline. While the Indian planter reposes in the belief that the colouring matter that had served for the dyeing of the cerements of Egyptian mummies 5,000 years ago, and the production of which still constituted a great industry, would continue to survive,

the German industrial chemists were seeking—with extraordinary patience, industry, and tenacity—to produce indigo synthetically. After eighteen years' work and the expenditure of nearly a million of pounds, their efforts have been crowned with success. In 1895-96 the total value of plant indigo produced was over three and a half million pounds and the acreage under cultivation 1,339,099 acres. Last year the value had fallen to between sixty and seventy thousand pounds and the acreage had been correspondingly reduced, the effects of the competition of synthetic indigo made in Germany. The means by which these results have been brought about are the liberal employment of properly trained men (the products of their technical schools and universities), the association of specialists with the management of the concerns, and a very complete organisation, which aimed not only at efficient and economical production, but also, by means of agencies all over the world, at pleasing and meeting the requirements of its customers. Clearly there was a pressing need that we should study the methods adopted by our rivals, and seek to profit by the lessons learned.

The Patents Act of 1907.

It is important to bear in mind that patent rights are involved in the question. The great firm at Ludwigshafen, for instance, known as the Badische Anilin und Sodafabrik, own many hundreds of patents in Germany and other countries, and maintain a large patent department manned by a very efficient staff of trained scientific chemists. In the year 1906, out of 14,700 patents issued in Great Britain, 6,500 were granted to foreigners. In the case of patents for dyes the proportion was about 95 per cent. The undesirability of affording the protection of British laws to patents involving manufactures carried on wholly outside the United Kingdom led to the placing on the Statute Book of the Patents and Designs Act of 1907. This Act provided, *inter alia*, for the revocation of patents covering articles or processes manufactured or carried on exclusively or mainly outside the United Kingdom. As a result of applications to the comptroller certain patents were revoked and a small number of German firms took steps to carry on a portion of their manufacture in England.

A Visit to Germany.

With a view to obtaining information respecting industries which might prove suitable for introduction into Ireland, and also of making known to foreign manufacturers affected by the Act the opportunities and facilities for industrial enterprise existing in Ireland, the Department sent as a deputation to Germany the writer, accompanied by Messrs. Horner and E. J. Riordan. The results of their visit were summarised in a Report issued on March 1st, 1909. Among other questions that of the German aniline dye industry is

dealt with in the report, and it is thought that the following extracts will be of use at the present juncture :—

Ludwigshafen.

"We were fortunate in being able to see a portion, at least, of the well-known works of the Badische Anilin und Sodafabrik at Ludwigshafen. By the kindness of the head of their Patents Department, Dr. Ehrhardt, and Dr. Lloyd, his assistant (both from Birmingham), we were shown through part of the huge works, to see the whole of which several days would be required. These works were founded in 1865 for the manufacture of colouring matters and other derivatives extracted from coal tar. In that year there were only thirty work people. In 1870 there were 835; in 1885, 2,377; in 1895, 4,450. Now there are 8,000. They employ, moreover, some 200 trained chemists, 100 engineers, and over 700 mercantile clerks. The area of the site of the factory is about that of the City of London. On one side of it is the Rhine, so that there is easy transport for the coal (they use 1,000 tons a day) to drive their 370 steam engines, and for the pyrites (of which they use 100,000 tons a year), and other raw materials required. For the manufacture of dyes they employ the products obtained from the distillation of coal tar, viz.: Benzene, Toluene, Xylene, Naphthalene and Anthracene. The first important development followed on the discovery of the preparation of Alizarine from coal tar derivatives by Graebe and Liebermann in 1868, and also by Perkin, at the same time. This discovery dealt a blow to the madder industry, and the madder plant is no longer cultivated for dyes. This is not the place for a full account of the progress of discovery in this branch of Chemistry, but each discovery in turn has been utilised and turned into gold. Their staff of trained chemists are continually adding to their store of knowledge, and are provided with well equipped laboratories. To the benches are distributed hot and cold water, compressed air, vacuum and electrical power. The commercial value of their discoveries is safeguarded by a patent department having some 17 assistants. They hold over 1,200 patents, and take out on an average about two a week. The firm lays itself out to meet the wants of its customers. Thus, for ex-example, it will receive a worker from a customer in order that he may for a few weeks learn the proper use of the dyes manufactured. There is a paper-making plant for the purpose of studying the effect of dyes on paper."

Artificial Indigo.

"The last great step forward is the artificial production of Indigo. Beginning with the work of Von Baeyer in 1880, Meyer and subsequent workers have at last brought the process to a successful issue. The cultivation of *Indigofera tinctoria* goes the way of *Rubia tinctorum*, and a most important industry gives place

to a new one created by the results of the work of the chemist. In 1886 Germany imported 1,036 tons of indigo; in 1898, 118 tons. To-day she exports it in large quantities. Much valuable information on this subject will be found in Dr. Rose's reports."*

"The Badische Company export about 75 per cent. of their products."

Hours of Work.

"The hours of work are fixed at 6 a.m. to 6 p.m., with intervals from 8 to 8.30, 12 to 1 and a quarter of an hour about 4 o'clock. No women or children are employed, and there is little Sunday or night work."

"The firm provides dwellinghouses for a large number of workmen and officials; also hospitals and medical attendance; a sanatorium for the treatment of tuberculosis, a convalescent home, schools, dining halls and baths; also security of tenure for honest and diligent workers. From the large dividends which have always been paid this policy appears to pay very well."

"It may be remarked here that important questions for a firm considering the establishment of a similar industry here would be:—

Important Considerations for Chemical Dye Industry.

(*a*) The cost of labour and motive power.
(*b*) The price of coal, alkali and acids.
(*c*) The availability of salt or brine.
(*d*) The price of land and the amount of taxes.
(*e*) The supply of water and provision for discharge of effluent."

"It was fitting while at Ludwigshafen that we should secure an interview with Hofrat Dr. Caro, of Mannheim, whose name is associated with some of the greatest chemical discoveries upon which the industry is built, and who, having played so leading a part in its wonderful development and earned his legitimate reward does not appear to abate one jot of his active interest. He discussed with us the problem of the utilisation of peat as keenly as though he were upon the threshold of his great and honourable career. He was aware of the experiments which have hitherto been carried out in various countries, and of the negative results of most of them, but he was still sanguine that a method would ultimately be found for profitably utilising this great natural resource."

* Diplomatic and Consular Reports. No. 561—Chemical Instruction and Chemical Industries in Germany, and No. 573—Supplementary Report on Chemical Instruction and Chemical Industries in Germany.

The Aniline Dye Industry of Germany.

"Of the industries enquired into the aniline dye industry is the one which seems most suitable for introduction into Ireland. For this reason it will be desirable to make a brief statement as to its growth and present status for the information of those localities which are considering the question. This particular industry is not "protected," and it is not too much to say that it owes its existence, development and present position to the results of scientific investigation, and that the career of the industry is inseparably bound up with the efficient system of Technical Instruction which has become a vital part of the German social system. The industry, moreover, may be said to have arisen from the utilisation of a substance which less than half a century ago was not only useless, but a nuisance to be got rid of with as little harm as might be. From being a useless waste product, coal tar has come to be an extremely valuable bye-product of gas manufacture."

"In the year 1834, the German chemist, Runge, prepared from the oil of coal tar, a substance which, on treatment with a solution of chloride of lime, produced a fugitive violet colour. This substance he named kyanol. It had been previously obtained by Unverdorben, in 1826, by the dry distillation of indigo. Fritsche, in 1840, obtained it by distilling indigo with potash, and called it *aniline*, from the name of the indigo plant, *Indigofera anil.* Faraday first discovered benzene in 1825. It was prepared from coal tar by Mansfield, working under Hofmann's direction; subsequently other workers converted it into nitrobenzene, and the nitrobenzene into aniline. This substance was of purely scientific interest until the year 1856, when William Henry Perkin, a student under Hofmann, in the College of Chemistry in London, was engaged in a research having for its object the synthesis of quinine. Operating on aniline, he obtained the violet colour as a permanent solid substance, and turned his attention to utilising it as a dye. When its value had been demonstrated he secured a patent for it, and when placed on the market it became generally known as mauve, a name given it by the French. This discovery formed the turning point in the history of aniline, and initiated an industrial revolution in which important natural dyes like Madder and Indigo were to be replaced by the artificial dyes produced from the products of coal tar. Concerning these dyes, Dr. Hofmann, the great German chemist, whose name is so closely connected with the discoveries upon which the industry is established, wrote the following in 1862:—

Hofmann's Prophecy.

'Instead of disbursing her annual millions for these substances, England will beyond question at no distant day

become herself the greatest colour producing country in the world; nay, by the very strangest of revolutions, she may ere long send her coal-derived blues to indigo-growing India, her distilled crimson to cochineal-producing Mexico, and her fossil substitutes for quercitron and safflower to China, Japan, and other countries whence these articles are now derived.' "

"These bold prophetic words were written in the very infancy of the industry. They have come true with one notable exception. For 'England' substitute the name of 'Germany' and the prophecy has proved itself as true as it was bold."

Annual Production of German Chemical Industries.

"Ten years ago the total annual production of the German Chemical industries amounted to nearly £40,000,000. Confining our attention, however, to the artificial dye stuffs alone, it may be remarked that in 1898 the total value of the manufacture of organic dyes in Germany was estimated at £6,000,000. In the year 1905 the total export value of artificial dye stuffs was £7,090,000, and in 1906 this had risen to £8,425,000, an increase of over $1\frac{1}{4}$ million pounds. In the early days of the industry enormous profits were made, and rapid extension took place. The profits now made are extremely large, as will be seen from the following table, which shows the dividends of the more important chemical factories as given in the Report of the Consul-General for the Consular District of Frankfort for the year 1906."

Profits in German Chemical Industries.

	Dividends in—			
	1903	1904	1905	1906
	Per cent.	Per cent.	Per cent.	Per cent.
Badische Anilin und Soda Fabrik . .	26	24	27	30
Chem. Fab. vorm. Weiler ter Meer (Uerdingen)	10	8	8	10
Verein chem. Fab. Mannheim . .	—	16	19	20
Chem. Fab. Buckau, Magdeburg . .	—	—	10	12
Chem. Fabr. Electron, Griesheim . .	12	12	12	12
Farbwerke vorm. Meister, Lucius . .	20	20	24	30
Deutsche Gold und Silberscheide-Anstalt, Frankfurt-am-Main . .	—	18	22	—
Chem. Werke Albert, Biebrich . .	15	18	19	$22\frac{1}{2}$
Friedrich Bayer u. Co., Elberfeld . .	25	30	33	36

In the footnote are given the dividends paid by some of the more important factories in 1911, 1912 and 1913.*

Syndication of German Industrial Concerns.

"It may here be pointed out that syndication has progressed to an extraordinary degree in Germany, and has profoundly affected chemical industries. The principal firms concerned with the production of artificial dye stuffs have established a community of interests. Thus the firm of Bayer & Co., Elberfeld, are associated with the Badische Anilin und Soda Fabrik and with the Aktiengesellschaft fur Anilinfabrikation, of Berlin. Again, the Farbwerke vorm. Meister Lucius and Bruning of Hochst on Maine are associated with Casella Co. of Frankfort on Maine, and with the firm of Kalle of Biebrich on Rhein."

English Branch of the Hochst Syndicate.

"The firms represented by the Hochst concern have already acquired a site at Ellesmere Port. The firms represented by the Badische Anilin und Soda Fabrik, of Ludwigshafen am Rhein, which holds British patents for the manufacture of synthetic indigo and many alizarine colours, last year sent a Commission to Great Britain to choose a site. They ultimately decided on a site at Birkenhead, near Liverpool. For the present these firms do not contemplate any further extensions of the kind, and it remains to be seen whether the operations proposed on these sites will be regarded as sufficient to satisfy the conditions of the Act."

The Badische Company comes to Birkenhead.

After dealing with the industrial conditions existing in Germany, the Report continues :—

"It is unnecessary here to deal at length with the corresponding

* NOTE.—Dividends Paid by some Factories in 1911-13.

	Dividends in—		
	1911	1912	1913
	Per cent.	Per cent.	Per cent.
Badische Anilin und Soda Fabrik	25	25	28
Weiler ter Meer. (Uerdingen)	—	—	12
Chem. Fab. Buckau, Magdeburg	12	—	—
Meister Lucius & Bruning	27	30	30
Deutsche Gold und Silberscheide Anstalt, Frankfort/M.	—	30	30
F. Bayer and Co. (Elberfeld)	25	25	—
Aktiengesellschaft f. Anilin Fabrikation	20	20	—
Vereinigte Glanzstoff Fabr.	36	36	36
Aktiengesellschaft Schering.	12	13	15 (4½ on Pref.)
Chemische Fabr. von Heyden	12	14	—
Chemische Fabr. J. D. Riedel	12	12	—
Verein für Chemische Industrie	—	20	22

social and industrial conditions in the United Kingdom. It is, however, highly interesting to read the opinions of a different kind expressed by Dr. Walther Rathenau, one of the leading captains of industry in Germany, in a recently published book."*

Views of Dr. Walther Rathenau.

"Dr. Rathenau considers that while England's industrial strength has not decreased it has diminished as compared with that of other countries. The reasons for this are that the Englishman—healthy, wealthy and strong—enjoys work, but does not sacrifice himself to it. He loves leisure, country life and sport. The German loves his work beyond everything and is insatiable in his thirst for knowledge. The Englishman's traditions warn him against adventure and experiment in the business of daily life. On the other hand, the American courts risk. He throws himself into every new enterprise, with the knowledge that out of a hundred failures one success will repay him a thousandfold. Even the cautious German of to-day speedily avails himself of innovations where these seem likely to be useful, without waiting for mathematical demonstration of their value. The Englishman, however, is conservative, and is not impelled to venture on risky enterprises, and, since he works his own business with his own money, meets every innovation with the question, 'Will it pay?' until his methods become antiquated."

"Dr. Rathenau considers Trades Unions a heavy drag on the wheels of English industry. The English worker dreams not of future partnership or international supremacy, but simply how to improve his own condition. He has, moreover, been able to give effect to his dream so that the manufacturer is simply a tool in his hands, and must do his bidding. Anyone, therefore, starting a new industry in England would find himself in difficulties. Raw material and transport facilities he would find in plenty, but his difficulties would begin with the worker. German schooling, adaptability and 'praxis' are not to be had in England, and that which is to be had costs as much as their (the Germans') best quality. 'The tradesman works about a fifth part less time and costs about a third more than in Germany.'"

"Speaking of the Chemical industry, he remarks that the reason the Germans have so far surpassed us is because English science is not strong enough to direct the numerous ramifications of the source of the 'black art' into the technical stream, and because English industry has not the army of trained workers which is annually recruited from the German high schools. The same diffi-

* *Reflexionen.* Dr. Walther Rathenau. (Pub. by Herzel, Leipzic.)

culties, he remarks, are encountered by the Electrical industries in England."

With the outbreak of war the question entered upon a new and almost tragic phase. In 1913 we imported from Germany:

	£
Alizarin and Anthracene Dyes	271,119
Aniline and Naphthalene Dyes ..	1,382,478
Synthetic Indigo	76,681
	£1,730,278

Lord Moulton, speaking in Manchester, on December 8th last, stated that we were consuming some two million pounds worth of dyes per annum, of which barely one-tenth was produced in this country. These two million pounds worth of dyes per annum were essential to an industry of something like £200,000,000 a year on which at least 1,500,000 workmen were dependent.

The danger is immediate and clearly defined. The question is no longer simply one of recapturing the industry for its own sake. It is a question of saving our textile and other industries dependent upon the dyes previously imported from Germany. British firms who have been manufacturing successfully in face of German competition * cannot possibly supply the deficiency, and pressure " of the most intense kind " has been put upon Switzerland to prevent Swiss manufacturers supplying to this country. The stoppage of supplies of intermediate products from Germany to the Swiss manufacturers renders such pressure peculiarly effective. The danger is not a transient one and it is not one that will pass away on the conclusion of the war. A condition of things under which an important and far-reaching section of British industry, involving, as it does, the employment of a million and a half of workmen, is under the domination of German dye manufacturers should no longer be permitted to exist. This fact has been recognised and a meeting of representatives of important firms and associations making use of artificial dyes was held at the Board of Trade on the 10th of November. It was then decided to elaborate a scheme for increasing the British supply of synthetic colours. A committee was appointed, consisting of representative men. Ireland is, of course, vitally interested in the question, and the Irish Industrial Development Association rendered a valuable service in convening a conference of Irish users of dyes at the Mansion House in Dublin, on the 12th of January. 1915.

* It appears that in 1907 some 139,000 cwts. of coal tar dyes were manufactured in the United Kingdom, valued at £373,000, of which practically the whole was consumed at home.

This meeting was held under the Chairmanship of Sir Nugent Everard (President of the Association) and was addressed by Mr. Charles Diamond (Director of the English Sewing Cotton Company, Limited) who explained the nature of the scheme proposed.

The scheme which is now before the public contemplates the formation of a Limited Company with a share capital of £3,000,000 in shares of £1 each. The Government to advance to the Company £1,500,000, bearing interest at the rate of 4 per cent. per annum, secured as a first charge on the assets and repayable in 25 years. It is an essence of the scheme that it shall be co-operative in character. Hence it is desired that the share capital should be subscribed by consumers of the dyes, who should also agree, with certain reservations, to take their supplies from the Company.

Not unnaturally the scheme has been subjected to very searching criticism and it is not possible now to say what its final form may be. It is clear, however, that a comprehensive attempt must be made to produce in this country the synthetic dyes required by the country, and that such an attempt must be (*a*) British, (*b*) on a large scale, and (*c*) co-operative, in that users of dyes must be vitally interested in dye production.

ROYAL COLLEGE OF SCIENCE FOR IRELAND.

*** *Under this general title a series of short articles dealing with the work of the Royal College of Science will be published in this* JOURNAL. *The first and second articles of this series appeared in the issue of the* JOURNAL *for October,* 1914, *Vol. XV., No.* 1. *The third article appears below.*

THE ENGINEERING DEPARTMENT.

By H. H. JEFFCOTT, B.A.I., M.I.MECH.E., A.M.INST.C.E.

I.—THE CURRICULUM.

The courses in the Faculty of Engineering aim at giving the student a thorough training in the scientific principles that form the basis of Engineering, and have in view his mental development by the reasoned study of problems of engineering practice. This training and development are carried out under conditions that embrace not only the full theoretical aspects of the subjects, but which also make considerable use throughout of workshops and laboratories. In this way, by making the student familiar with engineering processes, methods of construction, and commercial limitations, his education is developed along lines that may be pursued in his subsequent experience.

With these objects in view a syllabus of instruction has been prepared, according to which the work extends over a period, normally of four years. The syllabus includes all the fundamental subjects, such as Mathematics, Mechanics, Descriptive Geometry, Physics, and Chemistry, which are prominent in the early part of the course. Thereafter follow such subjects as Applied Mechanics, Mechanism, Thermodynamics, Metallurgical Chemistry, Applied Economics, Surveying, Properties of Materials, Workshop Practice, Machine Construction, Steam Engines and Boilers, Electro-technology and Electrical Machine Design, Design of Structures, Gas and Oil Engines and Hydraulic Machines.

Early in the curriculum of the Engineering subjects proper, the student is instructed in the usual processes of engineering construction and the properties of materials, leading to ability to design machine parts that are constructionally possible.

In this work much use is made of the constructive workshops—machine shop, foundry, smithy, patternmaking shop—and of the testing of materials laboratory.

The student then learns how to proportion the various members of structures according to the requirements of strength and

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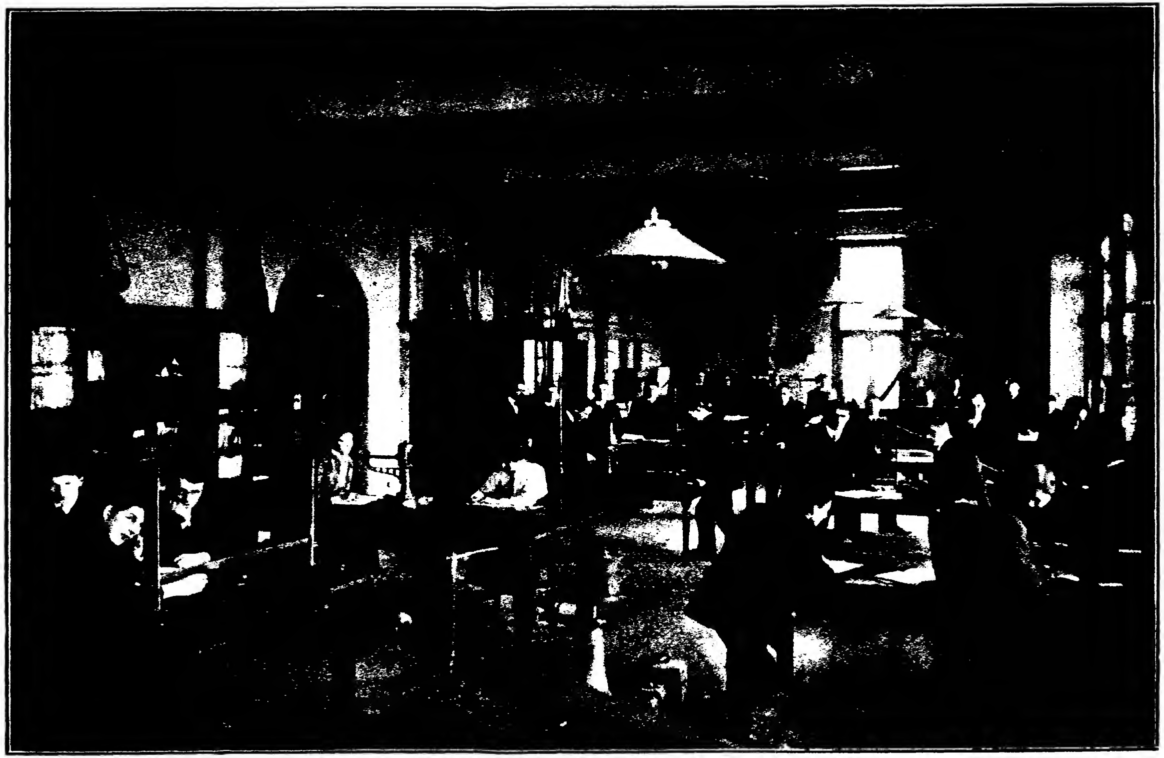

Fig. 1.—Laboratory for Experimental Mechanics.

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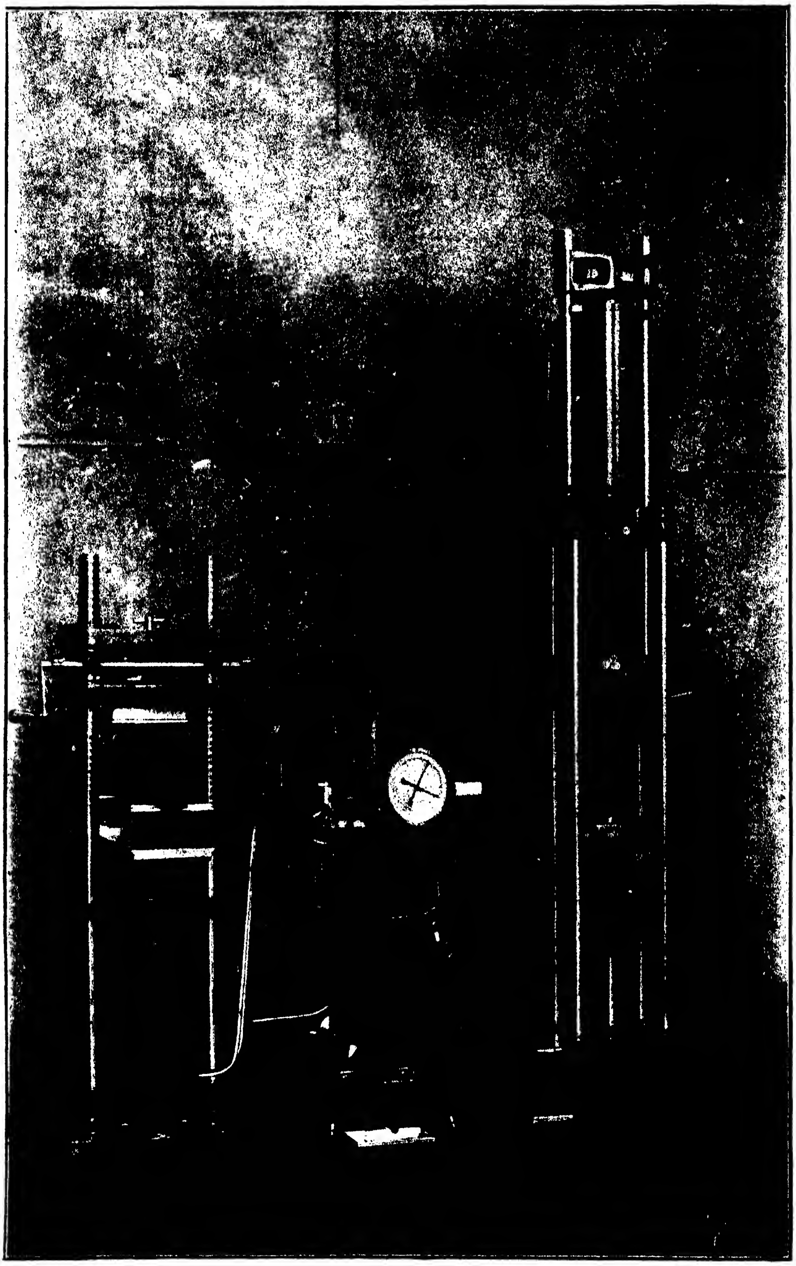

Fig. 2.—One hundred ton Compression and fifty ton Tension Testing Machines.

stability, and also the lines along which machines and structures may be produced economically. The methods of power production, of testing and estimating the performance of engines, machine tools, etc., are studied in the engine laboratories and shops combined with co-ordinated courses of lectures and practice at design.

Considerable prominence is given to the study of cost and its influence on design.

The student thus becomes able to combine in his design what is constructionally possible with the most economical proportioning and arrangement of parts, and with sufficiency of strength and stability.

II. Equipment.

It will be gathered that adequate instruction in a syllabus drawn up on these lines of necessity requires the provision of various workshops fitted with modern tools, and also laboratories containing examples of modern engines of several types for the study of power production.

To particularise, the following workshops and laboratories are necessary:—Drawing Office, Experimental Mechanics Laboratory, Testing of Materials Laboratory, Woodworking and Patternmaking Shop, Iron Foundry, Brass Foundry, Smithy, Machine Shop, Steam Boiler Laboratory, Steam Engine Laboratory, Gas and Oil Engine Laboratory, and Hydraulics Laboratory.

Accommodation has been found for all these laboratories and shops in the new Engineering building.

The equipment includes machines and engines of the best modern types, and of several different kinds so as to give breadth and variety to the training.

The installation of plant throughout is on a scale of practical engineering proportions. On the other hand, units of unnecessarily large size—which are both too bulky for effective educational work, and costly to instal and maintain—have been avoided. Further, the equipment is admirably suited for engineering research, and the research studentships available at the College provide facilities for this work.

In deciding on the character of the equipment the previous education of the average Irish student and his prospective outlook have been carefully borne in mind, and emphasis has been laid on those subjects that contribute to the development of Ireland's natural resources and industries.

In short, the aim has been to provide the most effective educational installation having regard to the syllabus of instruction, the student, and the needs of the country.

The object of the present article is to give some account of the more noteworthy items of the equipment.

Drawing Office.

The Drawing Office is a large room at the top of the engineering building, capable of accommodating some fifty students at a time. It is lighted by windows on all sides, and is fitted with drawing tables specially made to meet our requirements.

The electric lighting is arranged to give a well distributed illumination. Special lamps are employed, with reflectors to throw the light on a whitened ceiling from which it is reflected to the room.

A blue printing and white printing outfit is available, so that students may make copies from their tracings for use in the workshops.

Mechanics Laboratory.

The Mechanics Laboratory (see Fig. 1) is well supplied with the usual experimental apparatus. It is a well lit room, and the battens fixed to the wall all round serve as a very convenient means for supporting boards for polygon of force experiments and other apparatus.

The equipment includes a large experimental jib crane, several small cranes, roof trusses, levers, weighing machines, inclined planes, friction apparatus, differential wheel and axles, Weston blocks, acme blocks, toothed gearing, worm gearing, screw efficiency apparatus, pendulums, stop watches, centrifugal force machines, Young's modulus apparatus, torsion apparatus, impact apparatus of various kinds, etc.

Many of these appliances were made in our own workshops.

Surveying and Levelling.

For Surveying and Levelling the College possesses several instruments. These include a theodolite, Dumpy level, Adie's combined theodolite and level, Eckhold's omnimeter, Abney level, complete plane table equipment, range finder, sextants, prismatic compass, optical squares, compensated aneroid barometers, miner's dial, chains, planimeter, protractors, etc.

Testing of Materials.

The College is very well equipped for the Testing of Materials. The largest machines (Fig. 2) are those by Messrs. Amsler Brothers. A 100 ton machine for compression and bending tests, and a 50 ton machine for tension tests, are both operated by oil under pressure, supplied from a three plunger oil pump driven by electric motor. The pressures are read on a pendulum gauge.

A third machine, also by Messrs. Amsler, is designed for torsion tests up to 18,000 inch lbs., and is operated by electric power.

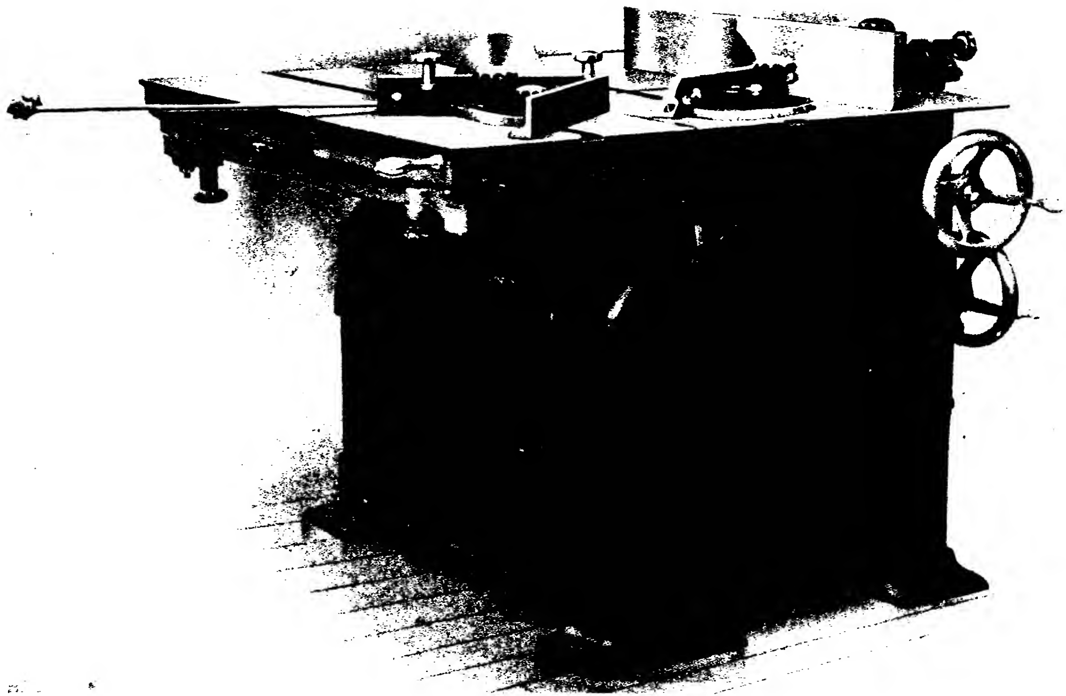

Fig. 3.—Circular Saw Bench.

Fig. 4.—Cupola.

There is considerable convenience in having separate large machines for each kind of test. Greater sensitiveness of measurement is possible, as the most suitable size and design of machine may be used for each kind of work. Thus 100 tons is often necessary for compression tests, while a maximum of 50 tons suffices for the usual requirements of tension testing.

A 5 ton Buckton machine is available for the smaller test work, and is capable of testing materials in tension, compression, bending, or torsion.

For measuring extensions there is a Martens extensometer for the highest class work, and other appliances.

Smaller machines include a hardness testing apparatus, impact testing apparatus, cement testing apparatus, etc.

Pattern Making and Woodworking Shop.

The equipment of the Pattern Making and Woodworking Shop is primarily arranged for instruction in the production of patterns for use in the foundry, but it is also intended for general construction in wood.

Probably the most useful machine here is the two spindle saw-bench with tilting table. It is specially adapted for accurate sawing, will cut compound angles, rough out coreboxes, do ripping and cross-cutting, grooving, mitring, bevelling, etc. It is illustrated in Fig. 3. The band saw, too, has a tilting table.

The planing and thicknessing machine is designed for planing, surfacing, jointing, bevelling, rebating and chamfering, and has an independent table (below the cutterblock) for planing to a thickness.

Two patternmakers lathes for wood turning are arranged on the same bed, and may be used as one lathe for any long job up to about 12 feet. The lathe is provided with an overhanging face-plate and pillar tool rest for extra large diameter work.

An emery grinder for the various tools and irons completes the power driven equipment. All these machines were made by Messrs. T. Robinson & Son, and are driven by belting from over-head shafting, which in its turn is driven by an 11 h.p. electric motor. Ample bench accommodation and a complete equipment of hand tools are provided.

Iron Foundry.

Turning to the Iron Foundry, a Thwaites' cupola is installed, capable of melting two tons of iron per hour. The cupola is some 22 feet in total height and 2 ft. 6 ins. in diameter, and is furnished with receiver and drop bottom. This is shown in Fig. 4. It receives the coke and iron through the charging door, which is above the flat roof of the foundry. The air blast operates through tuyeres

from an air belt, and is furnished by a Roots' blower—also by Thwaites—capable of delivering 1,300 cubic feet of air per minute. The blower is driven by electric motor. The cupola has peep holes for observing the condition of the molten metal.

The moulding sand covers a floor area of 300 square feet, and extends to a depth of about three feet. It will be gathered that castings of considerable size may be produced. There is an Evans' sand mill of 36-inch diameter, and a large equipment of moulding boxes and moulder's tools.

A gas heated oven about 11 ft. × 6 ft. × 6 ft. 6 ins. is provided for drying cores.

Thus iron founding by green sand, dry sand, or loam process can be carried out.

Brass Foundry.

The principal feature of the Brass Foundry, which adjoins, is the coke fired furnace pot holes. These can take crucibles containing up to 80 lbs. of metal, and are also useful for the smaller work in iron and crucible steel.

Two gas heated furnaces are also available, supplied with air blast, so that experimental work on special steels can be carried out at regulated temperatures. These furnaces will give temperatures upwards of 2,000° F.

The Smithy.

The Smithy contains three hearths of ample size, each provided with air blast from an electrically driven blower. There is a liberal supply of tools, swages, mandrels, etc., together with anvils and swage blocks. Many of these tools have themselves been made in our smithy. We have also made a series of pieces illustrating the different steps in the forging operations—from the commercial bar to the finished product—in several typical forgings.

The most striking feature in the smithy equipment, however, is the electro-pneumatic power hammer, made by Messrs. B. and S. Massey (see Fig. 5). This type of hammer presents very definite advantages in our shop over a steam hammer. The latter—to be always available—requires a constant supply of steam. This involves the continuous use of a boiler, and the condensation of steam in the pipe lines is a regular source of loss. In the electro-pneumatic type the hammer is operated by compressed air. An electric motor drives—through gearing—an air compressor which is mounted on the back of the hammer cylinder, and provides the necessary motive power for the hammer piston.

This hammer is carried on a special foundation and has a tup weighing 2 cwts. The motor is of 8 horse power, and it will be observed that power is being consumed only when the hammer is in action, so that stand-by losses are avoided. The advantage for intermittent working is obvious.

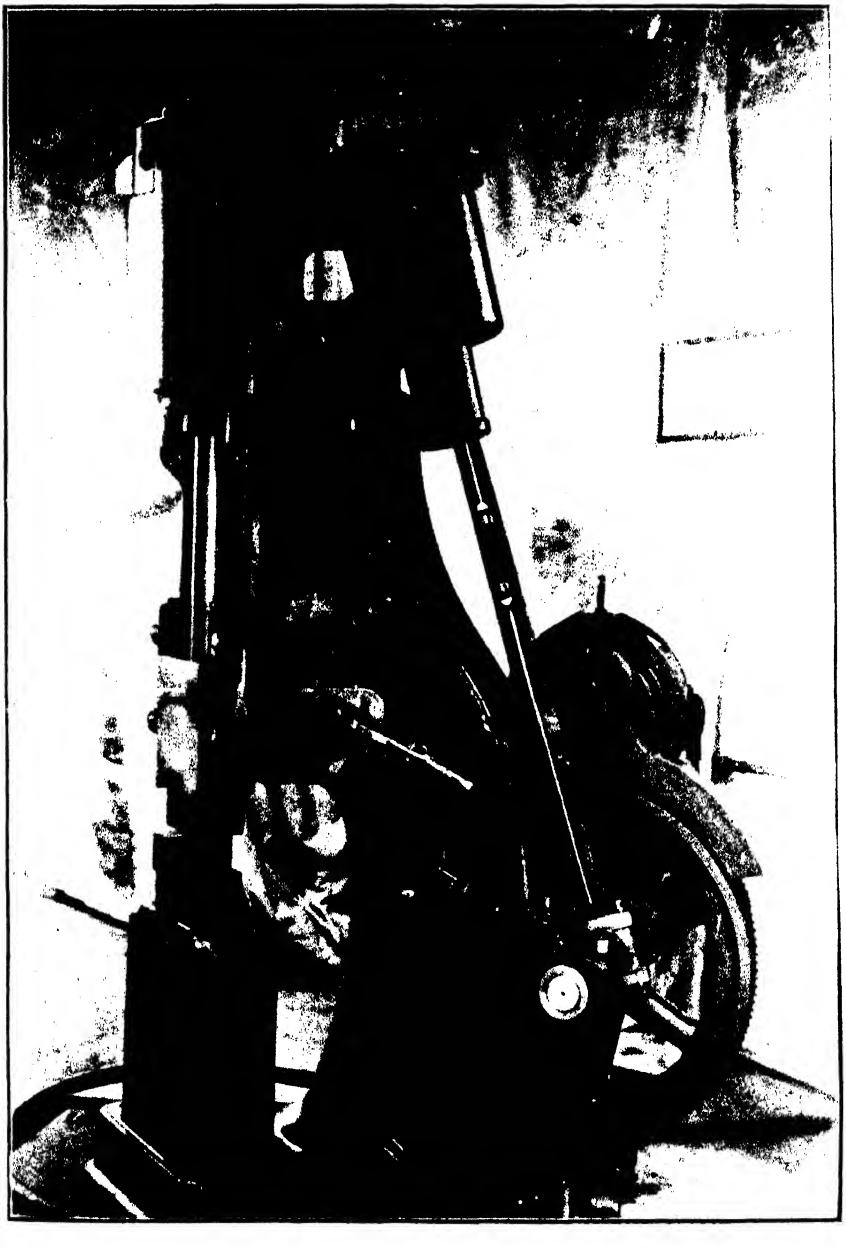

Fig. 5.—Electro-Pneumatic Power Hammer.

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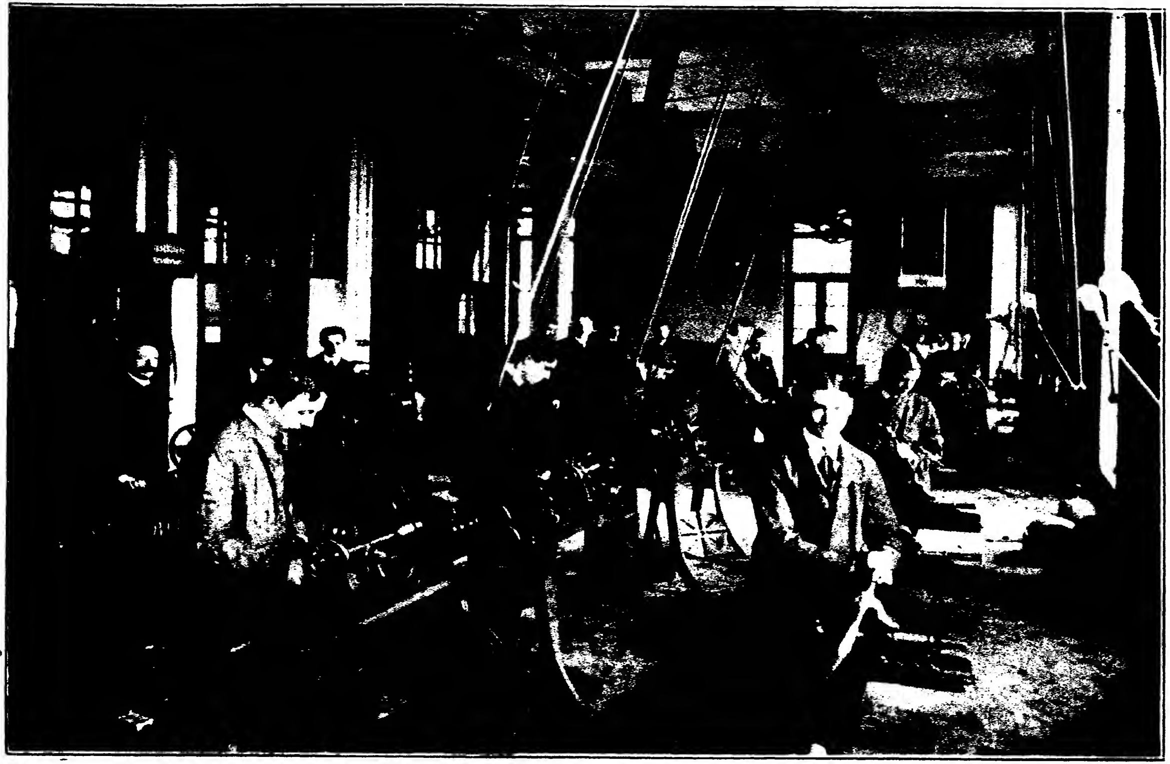

Fig 6.—Part of Machine Shop.

The installation further includes a complete outfit for oxyacetylene welding, appliances for brazing and soldering, and shears for plate metal.

The various hearths, furnaces, etc., in the smithy and foundries exhaust into an overhead flue, which connects with the main chimney shaft.

Machine Shop.

The Machine Shop (Fig. 6) covers a floor area of 2,500 square feet, and contains some 20 power driven machines, besides bench and vice accommodation for twenty-four students.

The typical machine shop processes are well represented. There are several lathes of different types; drilling machines; planing, shaping and slotting machines; milling and grinding machines; screwing and sawing machines.

Practically all the machines are suited for operation with high speed steel tools.

Fig. 7 shows a sliding, surfacing and screw cutting lathe by Messrs. Lang & Co. It is of 10½ inch centre height, 10 ft. length of bed, and takes 4 ft. 6 in. between centres. The gap is capable of swinging 38 inch diameter, and on full cut the lathe requires about 10 h.p.

The feature of most interest is the Lang patent fast headstock. It will be observed that it is driven from a single pulley, the speed changes being obtained in a gradual manner by means of cones connected by a special belt with bevelled edges. One half of each cone pulley is free to slide longitudinally, and they are moved by levers actuated by a worm and quadrant. As the belt drives entirely by its bevelled edges, it will be seen that the driving part of one pair of cones can be made larger, and of the other pair of cones smaller, or conversely, by revolving a hand wheel. In this way the speed of the driven shaft may be varied, and thus also the speed of the main spindle, which is actuated by it through single, or treble reduction gearing.

The feed changes are also very conveniently controlled.

Another type of modern lathe represented in our equipment is one in which the speed changes are obtained entirely by the use of gear wheels. It is by Messrs. Dean, Smith and Grace, has centre height of 8½ inches, length of bed of 12 feet, and can accommodate a length of 7 feet between centres. The gap bed is capable of taking work of 30 inches diameter, and the lathe has a 3⅝ inch hole through spindle. The all gear headstock is very conveniently operated by four handles, which may each take one of two positions. By varying the positions of the handles sixteen different speeds may be obtained, ranging from 10·4 to 289 revolutions per minute. The feed box also is conveniently arranged.

The Pratt and Whitney 14 inch engine lathe is specially suited for highly finished and accurate work, and represents high class American lathe practice.

The Smith and Coventry lathe is driven from a double speed countershaft to a three-step cone pulley, and is provided with back gear, so that twelve spindle speeds may be obtained.

For certain classes of small repetition work the capstan lathe represents modern machine shop practice. The capstan head can carry six tools, and on finishing one operation the next tool can be brought into action at once. Our capstan lathe was made by Messrs. Alfred Herbert, Ltd.

Four smaller sliding, surfacing and screw-cutting lathes, of 5 inch to 6 inch centre heights, by Messrs. Armstrong Whitworth, Drummond Bros., and Alfred Herbert, are suitable for beginners.

Of drilling machines we have one by Messrs. Greenwood and Batley, suitable for work up to 3 inch diameter. For small work, not exceeding 1 inch diameter, the ball-bearing sensitive drill, by Messrs. Alfred Herbert, is a very convenient machine, and is arranged for high speed operation.

The large planing machine can admit work 3 ft. × 3 ft., and has a stroke of 8 feet. This machine is by Messrs. Armstrong Whitworth, is rack driven, and has a normal cutting speed of 40, and a return speed of 140 feet per minute. The design is of a substantial character necessary for taking heavy cuts.

The shaping and slotting machines are also by Messrs. Armstrong Whitworth. The former is of 6 inch stroke, and is provided with all the usual accessories.

The self-acting slotting machine is well shown in Fig. 8. It has a stroke of 6 inches, and is specially designed for high speed working and taking heavy cuts.

The milling machine is by the Cincinnati Milling Machine Co. It is of universal type, has a range of 25 ins. × 8 ins. × 18 ins. and represents good design. It has all power feeds, and is provided with a dividing head. The handles controlling the various motions are very conveniently grouped.

The Norton Co.'s Universal Grinding Machine is designed to deal with all classes and shapes of tools, and it may also be used for internal or external grinding and for surfacing work. The machine takes work 36 inches between centres and swings 10 inches diameter. It is provided with attachments for grinding milling cutters, reamers, counterbores, taps, end mills, holes, arbors, etc.

The sliding work table traverses longitudinally when grinding holes, arbors, and such like; or it can be swivelled around on the column to traverse at right angles to the wheel spindle for surface grinding; it can also be traversed at any angle between these two positions.

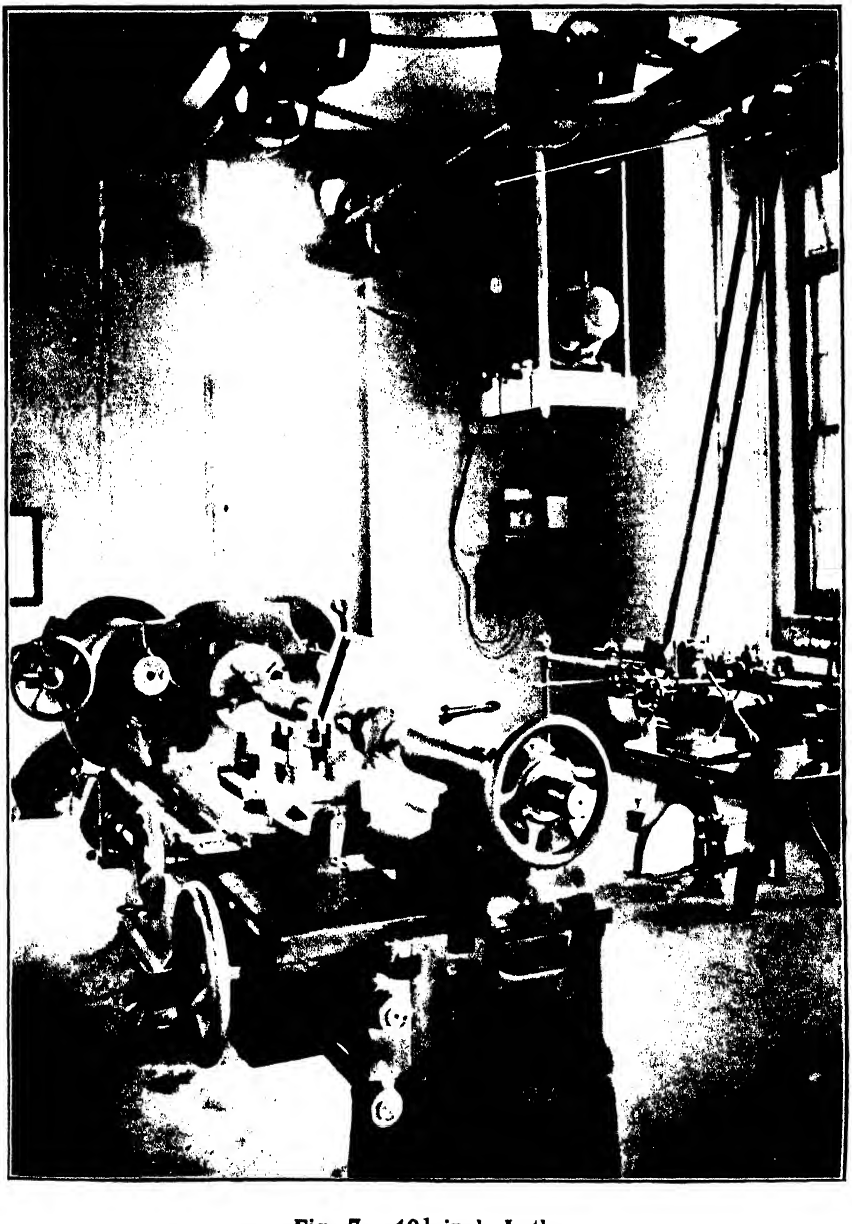

Fig. 7.—$10\frac{1}{4}$-inch Lathe.

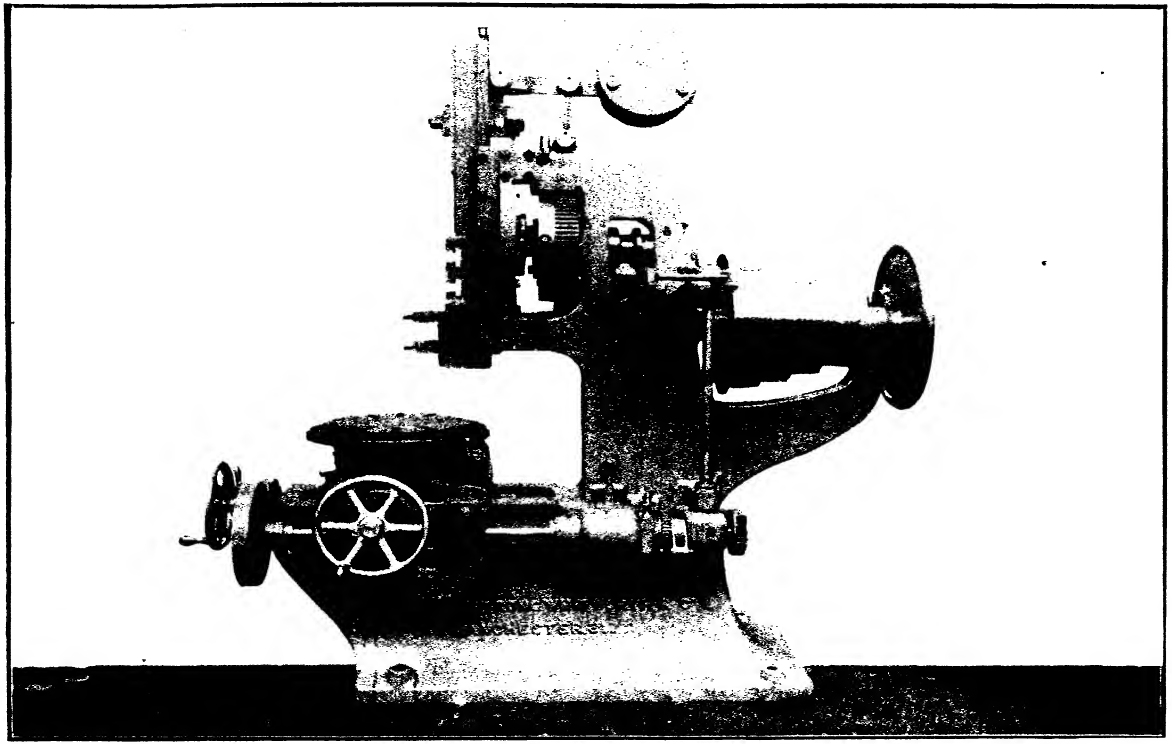

Fig. 8.—Slotting Machine.

The screw cutting machine is by Joshua Heap and Co., and is provided with dies for cutting threads up to 8 inches diameter.

Adequate tool grinders are installed, and a marking off table for setting out work. There is a liberal equipment of small tools, drills, cutters, reamers, screwing tackle, calipers, micrometers, gauges, etc.

Some of the smaller machines, and accessory parts such as lathe chucks, face plates, bench drills, etc., have been designed and made in the shops by the students.

The whole shop is driven by four 20 h.p. electric motors, which are connected to the main shafting by chain gearing, and Renold chains are also used for the drives from the main shaft to the countershafts. This method of driving is specially useful when the centre distances between the shafts are small, as is the case in our shop. There is a further advantage, educationally, in that we thus illustrate different methods of power transmission.

The subdivided drive—by four instead of by one motor—is more economical and satisfactory for the conditions obtaining in our shop.

Steam Boiler Laboratory.

The steam boiler installed in the Boiler Room is capable of supplying steam for all our steam engines. In selecting it the following points had to be considered:—(1) It should not occupy too much space. (2) It should be a quick steam raiser. (3) It must be safe. (4) It should be typical of the best modern practice. (5) It must be capable of being got into the building through somewhat restricted openings.

For these reasons a water-tube boiler was selected. Constructed by Messrs. Babcock and Wilcox, this boiler is capable of evaporating about 4,000 lbs. of water per hour from cold feed to steam at 160 lbs. per square inch pressure. It is provided with an integral superheater by which the steam may be superheated by about 150° F. if desired. The boiler is complete with all necessary gauges, etc., and has been tested at double the working pressure.

The boiler feed pump is by Messrs. Worthington, and is of their well known steam driven horizontal duplex double-acting type.

The coal store adjoins the boiler laboratory, and is underneath a roadway so that coal supplies may be got in very conveniently. Weighbridges are provided for use when tests on boiler efficiency are being conducted.

A suction gas producer plant, with scrubbers, is to be installed in the boiler house, and will be of a type suitable also for gasifying peat for power purposes.

The Steam Engine Laboratory contains engines representative of the principal modern types.

Steam Engine Laboratory. The horizontal cross-compound steam engine by Messrs. Marshall & Co., is shown in Fig. 9. It is designed for a regular output of 100 B.h.p., running at 125 revolutions per minute, with steam supply at 160 lbs. per square inch, working condensing. This engine is fitted on both cylinders with drop-valves and Marshall's patent trip gear, and represents the best modern practice in mill engines.

It is carried on very massive concrete foundations. The cylinders are steam-jacketed, and an intermediate heater is provided through which the steam passes on its way from the high pressure to the low pressure cylinder.

Although a standard engine, it may be run in a great variety of ways, making it very suitable for experimental work. This is rendered possible, principally, by the provision of extra valves and by the addition of a coupling in the shaft. Thus the engine may be run in the following different ways:—as a compound engine, condensing or non-condensing, and in each case with superheated or with saturated steam, with or without steam jackets, with or without interheater, with various degrees of cut off, and with various amounts of cushioning. Further, by disconnecting the low pressure side it can be run as a single cylinder drop valve engine, condensing or non-condensing, with superheated or with saturated steam, with or without steam jacket, with various degrees of cut off, and with various amounts of cushioning. It will be seen, therefore, that a great variety of experimental work is possible with this engine.

A rope brake and drum with water cooling arrangements is provided for the measurement of brake horse power. The engine may also be used to drive an electric generator by belting, and thus supply power for our workshops. Indicator diagrams may be taken from each cylinder, and various temperatures may be measured.

A separate condensing plant for use with this engine is provided. This is of the surface type, and the cooling water is circulated to a flat distributor and tank on the roof of the building. The air pump is of the Edwards type, and a centrifugal pump is used for circulating. Both pumps are electrically driven. Messrs. Marshall have also supplied this plant.

The quick revolution engine (Fig. 10) is by Messrs. Belliss and Morcom, and is of their well known compound two-crank enclosed self-lubricating type. It runs at 600 revolutions per minute, and gives 60 B.h.p. when supplied with steam at 160 lbs. per square inch. This engine is direct coupled to an alternating current generator (by Messrs. Siemens Brothers) with exciter, and the

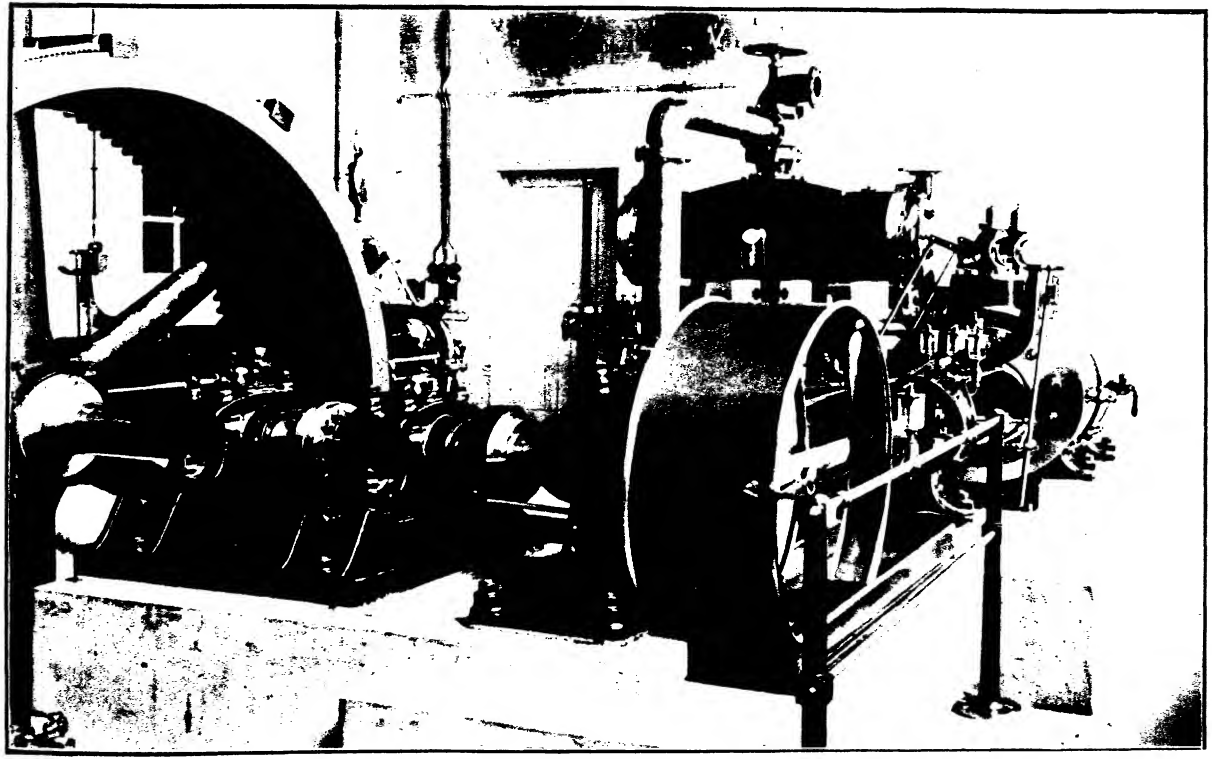

Fig. 9. 100 B.H.P. Compound Steam Engine.

ROYAL COLLEGE OF SCIENCE—FACULTY OF ENGINEERING.

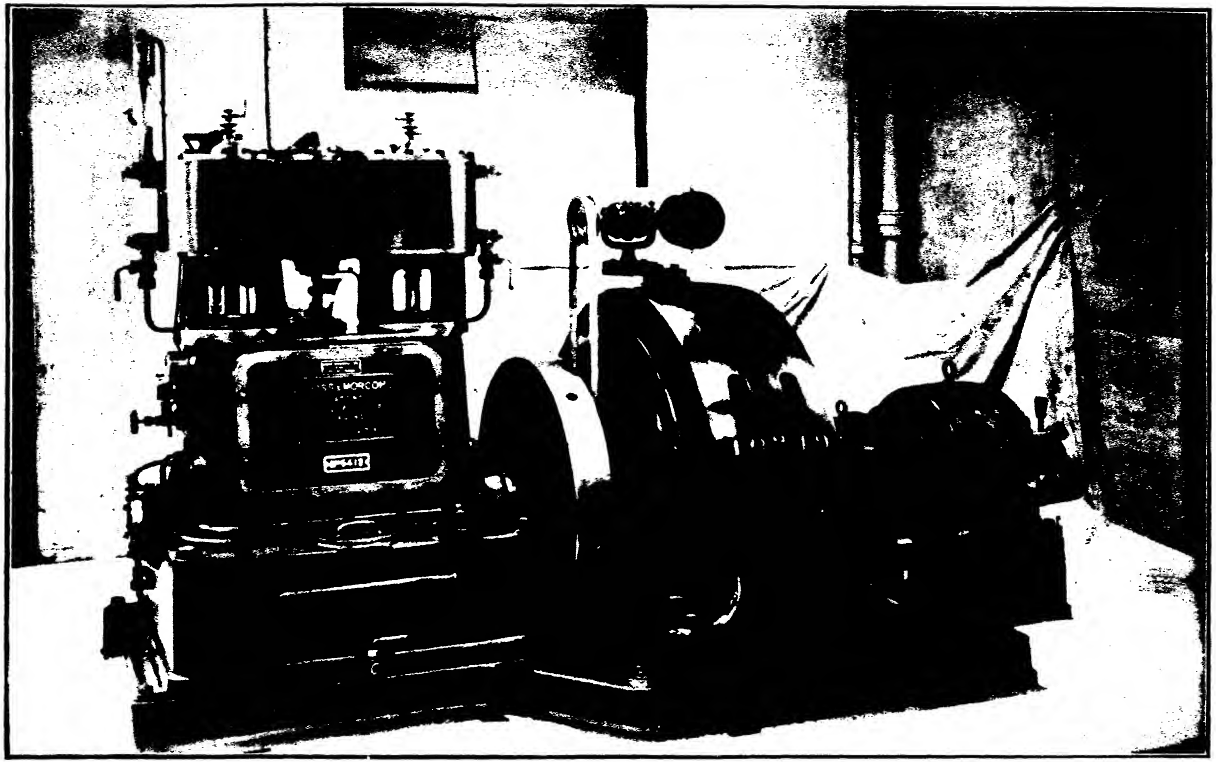

Fig. 10.—60 B.H.P. Vertical Compound Steam Engine and Electric Generator.

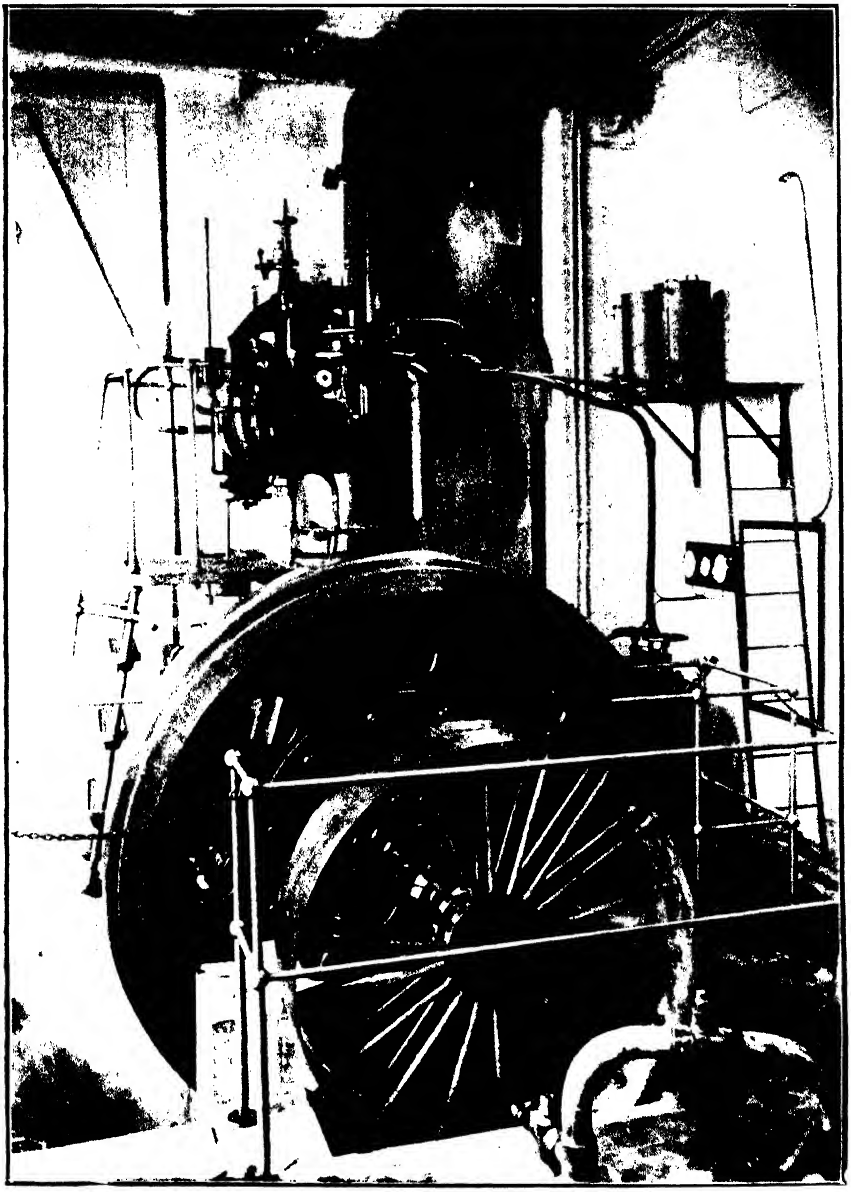

Fig. 11. 50 B.H.P. Diesel Engine.

ROYAL COLLEGE OF SCIENCE—FACULTY OF ENGINEERING.

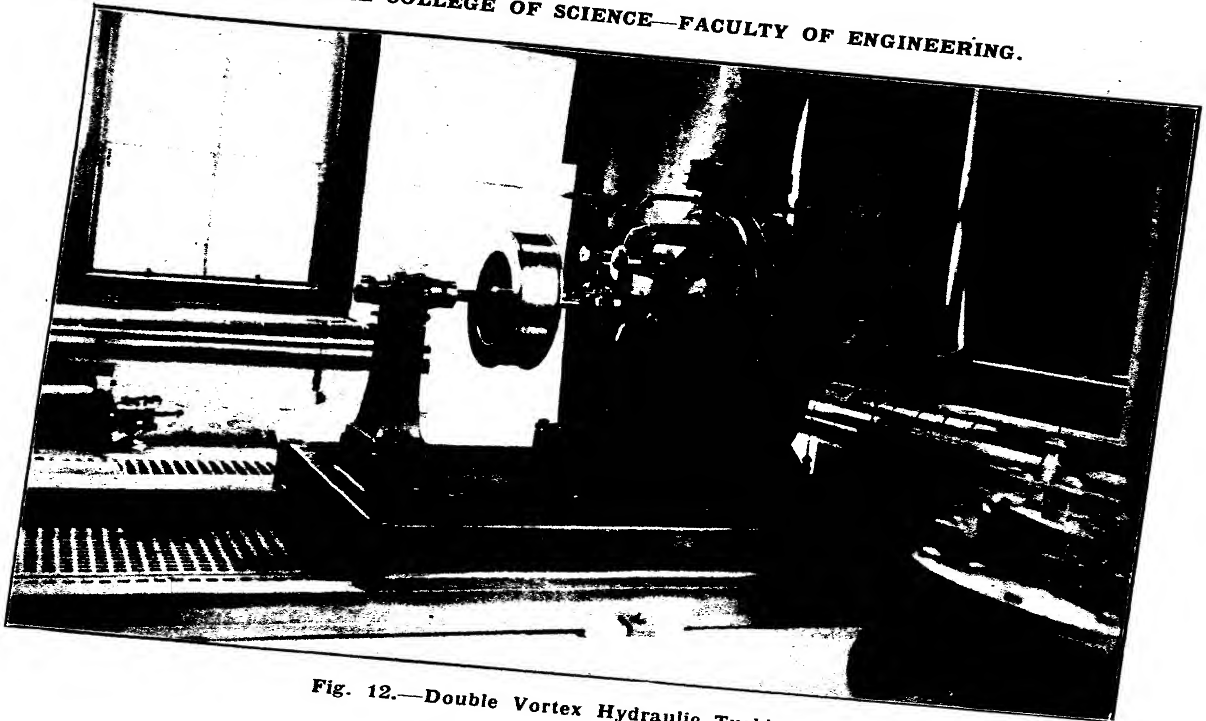

Fig. 12.—Double Vortex Hydraulic Turbine.

generating set will ordinarily supply the necessary power to our several workshops. The engine is also suited for the taking of various diagrams and measurements.

An 8½ h.p. vertical steam engine has also been installed. This is by Messrs. Robey, and is a slide valve engine running at 250 revolutions per minute. This engine is specially suited for beginners, and has arrangements for carrying out all the usual simpler measurements, such as taking indicator diagrams and measuring brake horse power.

Steam turbines are represented by a 10 B.h.p. De Laval turbine, constructed by Messrs. Greenwood and Batley. This turbine is of the impulse type, and runs at the very high speed of 24,000 revolutions per minute. It drives through double helical gearing, by which the speed is reduced to 2,400 revolutions per minute.

An electrically driven air compressor will be available for tests and experiments, and will supply air for use with pneumatic tools in the shops.

There are many smaller items of equipment in the engine laboratory, such as indicators, pressure gauges, etc.

Large trenches below floor level are provided for carrying the incidental pipe work, the live steam piping alone being carried overhead.

This laboratory serves also as an electric generating station for supplying power to our workshops.

Internal Combustion Engine Laboratory.

The Internal Combustion Engine Laboratory contains six engines giving an aggregate of nearly 100 horse power.

The principal item is the Diesel engine (Fig. 11), which gives 50 B.h.p. and runs at 250 revolutions per minute. It was built by Messrs. Mirrlees, Bickerton and Day, and is of the single cylinder type operating on the four stroke cycle.

It is provided with air receivers and fuel filter tanks, and is fitted with fly-wheel with special water cooled rim for making brake tests. This engine will work on very crude oil fuel.

An 11 B.h.p. oil engine of latest type, by the National Gas and Oil Engine Co., is arranged for experimental and test work.

A 10 B.h.p. gas engine, by Messrs. Crossley Bros., is likewise arranged for experimental work, and may be run on producer or town gas.

Petrol and paraffin engines are also represented in the experimental equipment.

Amongst the smaller engines a 10 B.h.p. petrol engine of motor car type is interesting as having been entirely designed and made

in the College workshops by the students. It is a two cylinder engine, provided with both magneto and coil ignition, and is now set up for experimental work.

The usual accessory appliances are also provided, including indicators, calorimeters, etc.

Hydraulics Laboratory.

The Hydraulics Laboratory contains examples of the typical machines actuated by water power.

A hydraulic turbine (Fig. 12), by Messrs. Gilkes and Co., has been installed. It gives about 3B.h.p. when operated with a head of 60 feet and running at 1,000 revolutions per minute. The case is of cast iron, the guide blades of gunmetal, and the revolving wheel of brass. The turbine is of the double vortex type, and the guide blades are movable for adapting the entrance orifices to any quantity of water below the full supply, and are fitted with gearing for their adjustment. This turbine is arranged for experimental work, being provided with a brake wheel and measuring appliances.

A Pelton wheel, also by Messrs. Gilkes, has a wheel of 24 inches diameter, and develops about 3 B.h.p. It is fitted with spear regulating nozzle. The casing is made with glass panels, so that the action of the water on the buckets may be inspected while the machine is running. The Pelton wheel is provided with brake wheel, etc., for experimental work.

The high lift centrifugal pump is capable of raising 300 gallons of water per minute against a head of 70 feet. It is driven through a flexible coupling by a 10 B.h.p. electric motor, running at 1,450 revolutions per minute.

Three large measuring sumps are provided for the absolute measurement of the water used, and the water is conducted thereto from the turbine and Pelton wheel by a long channel, in which notches are used to measure the flow. Further, a Venturi meter is fixed in the pipe lines leading to the machines, so that various methods of measuring the flow of water may be compared with one another, and verified by absolute measurement.

The pump serves to raise the water from the sumps to a tank on the roof, from which the water is fed to the turbines. By an arrangement of valves the pump can also supply water direct to the turbine and Pelton wheel at various pressures controlled by throttling, so that these machines may be operated with various heads.

In conclusion, it is hoped that this short review of some of the more important and interesting items of the engineering equipment will give a picture of its representative character, and show that the College possesses in every essential particular the plant necessary for giving a sound education in Engineering.

THIRD IRISH EGG-LAYING COMPETITION.

1st OCTOBER—31st DECEMBER, 1914.

The third annual Laying Competition began on the 1st October, 1914. There are thirty-three competing pens of the following breeds, viz. :—

White Wyandotte . . .	12 pens.
Rhode Island Red . .	8 ,,
Buff Orpington . . .	4 ,,
White Leghorn . . .	3 ,,
Brown Leghorn . . .	2 ,,
Black Minorca . . .	2 ,,
Red Sussex . . .	1 ,,

In addition to these there are eleven non-competing pens entered from the Department's Stations, the test of second-year birds is continued, and a test of third-year hens is in progress for the first time.

Quality of Birds.

There is a notable improvement in the quality of the pullets, especially in White Wyandottes, and some excellent scores have been made in this section. One pullet in Pen 22 (No. 129) laid, from October 14th to December 2nd, 50 eggs without a break.

It is regrettable that some of the eggs in this section are small. In one pen 21 eggs have failed to reach the minimum of $1\frac{1}{2}$ oz. and have not in consequence been credited. In this pen and in one other, all the eggs are second-grade.

The Rhode Island Reds come an easy first for size and colour of egg. Many of the birds in this section had their chances spoiled by being too late hatched or by being badly reared.

The Minorcas are of average quality ; in Pen 2 some very deeply-tinted eggs show an undesirable infusion of alien blood, probably through using exhibition males.

The White Leghorns are of good quality and should do well. The leading pen of Orpingtons is of good utility type.

Health.

The health of the birds has been good; three birds died since 1st October.

The weather in October and during part of November was ideal.

Weather Conditions.

In December, however, the conditions were about as bad as could be. The rainfall was almost continuous, and this was accompanied by cutting winds which drove it into the houses and nests and necessitated a good deal of work in keeping the birds comfortable. Notwithstanding this difficulty, however, the average for the quarter shows a gratifying improvement on previous results.

Intending Competitors for 1915-16 should be very careful not to breed from male birds the progeny of hens laying eggs under 2 ozs., or hens that go broody frequently. Such birds will be likely to transmit these faults to the pullets.

The following tables show the position of the different pens on 31st December, 1914:—

[TABLE.

TABLE A.—COMPETING PENS.

Order of Merit.	No. of Pen.	Breed.	No. of Eggs laid.	Value of Eggs. £ s. d.	Remarks.
1	13	Buff Orpington	271	2 4 0½	
2	25	White Wyandotte	241	2 0 0½	
3	21	„ „	238	1 18 7	
4	22	„ „	229	1 17 8½	
5	23	„ „	222	1 15 11	
6	15	„ „	213	1 14 7	
7	4	White Leghorn	188	1 9 7½	
8	20	White Wyandotte	187	1 8 10	
9	1	Black Minorca	175	1 8 9	
10	5	White Leghorn	175	1 8 7½	
11	31	Rhode Island Red	168	1 7 5½	
12	10	Red Sussex	164	1 6 9	
13	28	Rhode Island Red	155	1 6 2	
14	6	White Leghorn	150	1 5 1	
15	33	Rhode Island Red	145	1 4 11	
16	27	White Wyandotte	144	1 3 7½	
17	24	„ „	136	1 2 6½	
18	19	„ „	139	1 2 4	
19	34	Rhode Island Red	130	1 1 9½	
20	18	White Wyandotte	132	1 1 8	
21	14	Buff Orpington	128	1 1 6	
22	36	Rhode Island Red	122	1 0 9½	
23	11	Buff Orpington	109	0 18 8½	
24	2	Black Minorca	108	0 18 3	
25	35	Rhode Island Red	107	0 17 8	
26	16	White Wyandotte	96	0 15 7½	
27	8	Brown Leghorn	87	0 14 4	
28	17	White Wyandotte	65	0 11 2	
29	29	Rhode Island Red	65	0 10 10½	
30	32	„ „	50	0 8 8	
31	12	Buff Orpington	46	0 7 11½	
32	30	Rhode Island Red	45	0 7 9½	
33	9	Brown Leghorn	42	0 6 11	

TABLE B.—NON-COMPETING PENS.

1	26	White Wyandotte	281	2 7 0	
2	39	Rhode Island Red	228	1 17 8	
3	43	„ „	197	1 11 6	
4	41	„ „	169	1 7 7½	
5	38	„ „	160	1 6 6½	
6	37	„ „	163	1 5 10	
7	44	White Wyandotte	135	1 1 8	
8	40	Rhode Island Red	121	1 0 7½	
9	3	Black Minorca	89	0 15 2	
10	7	White Leghorn	42	0 7 3	
10	42	Rhode Island Red	42	0 7 3	

TABLE C.—SECOND YEAR HENS.

1	45	Rhode Island Red	127	1 0 0½	
2	50	„ „	109	0 16 9½	
3	47	„ „	102	0 16 0½	
4	46	„ „	19	0 2 11	

TABLE D.—THIRD YEAR HENS.

1	49	Rhode Island Red	72	0 11 1½	
2	48	„ „	36	0 5 6	

L. MURPHY.

EGG RECORDS FOR THE YEAR 1913-14.

In the issues of the Department's JOURNAL, Vol. VIII., No. 4, and Vol. IX., Nos. 1, 3 and 4, articles appeared pointing out the need and use of egg records; and an article specially devoted to the keeping of egg records on the trap nest system was published in the JOURNAL, Vol. X., No. 2. Details of the results of the keeping of egg records during the year 1908-9 were published in the JOURNAL, Vol. X., No. 3; for the year 1909-10 in the JOURNAL, Vol. XI., No. 1; for the year 1910-11 in the JOURNAL, Vol. XII., No. 2; for the year 1911-12 in the JOURNAL, Vol. XIII., No. 2; and for the year 1912-13 in the JOURNAL, Vol. XIV., No. 1. The following article gives similar particulars of the results obtained during the year 1913-14.

Number of Records.

In all, the appended Tables (pp. 380 *et seq.*) give particulars of 144 flocks, but of these only 106 are complete annual records, as some of the record keepers did not send returns throughout the whole of the period, and others of them broke up their pens or changed their breeds during the year.

The general average for the flocks is rather more than 111 eggs per bird per annum.

Some Results.

Looking somewhat more closely into the returns it is seen that one flock of birds gave a result of over 180 eggs per bird per annum. In addition six flocks gave over 170 eggs per bird, two over 150, seven over 140, twelve over 130, thirteen over 120, and seventeen flocks over 110 eggs per bird.

In all, 55 flocks gave over the general average, and 51 less than the average. Out of the 106 flocks, 71, or about 67 per cent., gave over 100 eggs per bird during the year.

The results obtained can be seen in detail from the accompanying Table:—

TABLE A.

Name of Breed.	Average of all the flocks.*	Average of best flock.	Average of worst flock.
White Leghorns,	140·5	175·3	93·6
Brown Leghorns,	106·8†‡	106·8†	106·8†
Minorcas,	147·1‡	178·7	172.0
Buff Orpingtons,	120·7‡	127·4	114·4
White Orpingtons,	97·0‡	121·8	59·7
White Wyandottes,	94·5	125·0	74·3
Faverolles,	93·8	123·3	67·2
Plymouth Rocks,	99·5	144·1	60·9
Rhode Island Reds,	120·9	144·3	86·6
Light Sussex,	117·5	172·6	81·4
Red Sussex,	—	—	—
Houdans,	126·1‡	136·2†	136·2†
Mixed Breeds,	112·0	188·8	63·4
All kinds,	111·5	188·8	59·7

* For the number of Birds of each Breed see Tables, pp. 380 *et seq.*
† One flock only. ‡ These records relate to less than 100 hens.

This Table shows some striking facts. Thus, while White Leghorns had the satisfactory average of 140·5 eggs per bird, the best flock of this breed gave the very good result of 175·3 eggs per bird, while the worst flock had the average of 93·6 eggs per bird. Similarly, White Wyandottes with the return of 94·5 eggs per bird had a best flock, giving the result of 125·0 eggs per bird, whilst the worst flock gave 74·3 eggs per bird. Rhode Island Reds, which showed the satisfactory average of 120·9 eggs per bird for all flocks, had the good result of 144·3 eggs per bird for the best flock, and 86·6 eggs per bird for the worst. Again, Mixed Breeds, with the fair result of 112·0 eggs per bird for all the flocks, had the very good result of 188·8 eggs per bird for the best flock, but the low result of 63·4 eggs per bird for the poorest flock.

The breeds that did well were White Leghorns, Minorcas, Rhode Island Reds and Buff Orpingtons. Houdans also gave the satisfactory result of 126·1, but the record only relates to a single pen. On the other hand the results obtained from White Wyandottes and Faverolles were disappointing.

For the purposes of contrast, the general averages for the years 1908-9 to 1913-14 are set forth below:—

TABLE B.

Name of Breed.	Average for the Year.					
	1913–14.	1912–13.	1911–12.	1910–11.	1909–10.	1908–9.
White Leghorns,	140·5	134·2	131·4	119·7	120·7	128·5
Brown Leghorns,	106·8	149·6	130·0	122·9	131·0	121·3
Minorcas,	147·1	204·7	131·9	133·0	123·4	107·1
Buff Orpingtons,	120·7	113·9	102·3	102·1	104·2	119·6
White Orpingtons,	97·0	108·8	112·5	116·8	105·5	—
White Wyandottes,	94·5	102·2	115·1	106·5	90·5	123·2
Faverolles,	93·8	102·4	81·4	95·0	105·1	107·5
Plymouth Rocks,	99·5	107·3	95·2	112·8	117·8	93·3
Rhode Island Reds,	120·9	122·3	138·8	128·5	—	—
Light Sussex,	117·5	95·3	98·9	87·9	83·9	73·3
Red Sussex,	—	—				
Mixed Breeds,	112·0	112·1	109·0	111·6	112·0	105·7
Houdans,	126·1	158·5	142·0	159·4	127·8	151·9
All kinds.	111·5	112·5	108·4	110·3	111·1	109·5

It will be seen that all the flocks taken together gave a slightly higher result than the average for the six years though a lower one than last year's. The outstanding feature of the returns, however, is the practical identity of the figures—the records being as under:—

Records for the years 1908-9 to 1913-14 contrasted.

1908–9 ..	109·5	1911–12 ..	108·4
1909–10 ..	111·1	1912–13 ..	112·5
1910–11 ..	110·3	1913–14 ..	111·5

Table B. shows the general results, but poultry-keepers would do well to examine the records of each pen of birds, and not only the returns of the best pens. They should consider also the general averages shown by the breeds. Doing so will enable them more profitably to compare the different breeds, and will also bring out clearly the great value of strain as against breed. In fact, it will be evident that strain, as far as egg production is concerned, is at least as important as breed. An examination of the Tables shows that whilst the general averages of the various breeds are not very markedly different, there are very great variations indeed between the results shown by the best-laying strains and the worst-laying strains. This can clearly be seen in the figures in Table A. Some salient facts may be pointed out. Thus, we have a flock of White Leghorns giving the very good average of 175 eggs per bird per annum, as contrasted with another flock of birds of the same breed which yielded only 93 eggs per bird per annum. Similar variations are shown in other breeds. One flock of Mixed Breeds has the excellent result of 188 eggs per bird per annum, and another flock has the poor result of 63 eggs per bird per annum. Again, one flock of Light Sussex has the very good return of 172 eggs per bird, and another the poor result of 81 eggs per bird. A close examination of the returns will show many similar variations. It is not intended to claim that all the differences in results are solely due to strain, but the fact that such variations occur in all the breeds points to the conclusion that strain is the predominant cause of the wide variation.

The Importance of Strain.

The second lesson taught by the Tables is the great value of egg-laying records. For it will undoubtedly give food for thought when it is realised that one poultry-keeper may obtain an average yield of well over 180 eggs per bird per annum, while another poultry-keeper gets only about one-third that number of eggs. These figures, and others like them which occur frequently throughout the returns, will give a poultry-keeper, whose birds are showing results below the average, much reason to look carefully into his choice of birds and his method of keeping them.

The Value of Records.

An average of 111 eggs per annum for birds kept under farming conditions—the general average shown for all birds in these returns—may be satisfactory up to a point, and it is undoubtedly above the general average of the country; but when results as high as those obtained by some of the more successful poultry-keepers can be attained, there is very considerable scope for improvement by the poultry-keeper whose results are only up to the average.

Profit and Loss.

It is not easy to estimate the average cost of a hen for a year, as conditions differ materially. For instance, on a farm hens pick up a good deal of food and consequently they can be fed more cheaply than in cases where all their food has to be purchased. The cost of keeping hens will thus vary considerably—from very little to 6*s*. per hen per year. The variations of cost being so wide, it is difficult to strike an average. Probably the average cost per hen for food from first to last is from 3*s*. 6*d*. to 4*s*. per year. Just as the cost of keeping hens varies, so also the prices obtained for eggs differ considerably; but if the price received be taken at, say, one shilling a dozen all the year round—a fair average price, though in the present exceptional conditions higher prices range—it will be seen that, to merely cover cost of food, a hen must lay not less than 50 eggs a year, and, if some slight profit and return for the care given is to be obtained, each hen should lay not less than 80 eggs per annum. Now, when we have in our returns a pen giving results as low as 60 eggs per annum, there is good reason to believe that there must be many flocks, or at least very many birds, giving averages below 60 eggs per hen per annum, and, therefore, hens which are being kept at no profit and perhaps at a loss. These considerations will show how important it is for every poultry-keeper to carefully watch the egg-production of his fowl, and the attention that should be given to the selection of birds of good egg-laying strains. Both these facts emphasize the necessity of keeping egg records.

As will be seen from the attached Tables (pp. 380, *et seq.*) a considerable number of egg records are being kept in Ireland, but it is very desirable that the number should be greatly increased.

The Department, therefore, wish to know of farmers and other poultry-keepers who are willing to keep Egg Records. An Egg Record Book in which returns can be kept will be sent free to all applicants. Applications, which need not be stamped, should be addressed to—The Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin.

EGG RECORDS.—

SUMMARY

Name of Breed.	October.		November.		December.		January.		February.		March.	
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.
White Leghorns, .	206	3·4	255	1·8	261	4·7	279	7·8	327	10·2	318	19·5
Brown Leghorns, .	20	0·9	40	0·0	37	1·6	34	5·9	34	12·2	34	17·5
Minorcas, . .	34	10·1	59	7·6	58	7·7	88	6·1	90	10·0	89	19·0
Buff Orpingtons, .	74	6·9	78	5·4	7[illegible]	10·[illegible]	79	9·9	79	10·1	74	15·7
White Orpingtons, .	87	1·9	101	1·8	100	2·7	98	6.4	97	10·5	89	15·3
White Wyandottes,	301	3·4	317	1·8	281	3·4	301	5·0	301	7·6	269	12·7
Faverolles, . .	250	1·6	286	1·3	336	3·6	300	6·1	299	8·0	297	14·3
Plymouth Rocks, .	426	3·[illegible]	482	2·6	486	3·4	513	5·3	504	8·9	488	15·1
Rhode Island Reds,	170	5·2	159	3·4	196	4·2	231	8·1	231	10·2	230	17·3
Light Sussex, .	113	6·2	129	3·7	129	5·7	135	8·8	135	10·6	135	14·7
Red Sussex, .	7	0·0	7	0·3	7	4·7	7	10·9	7	6·9	7	9·7
Houdans, . .	19	3·1	19	3·3	19	5·8	18	8·4	19	9·1	18	16·7
Mixed Breeds, .	3,090	4·1	3,003	2·7	3,096	4·0	3,329	6·8	3,392	9·9	3,361	14·9
Totals, .	4,797	3·9	4,935	2·6	5,080	4·1	5,412	6·7	5,515	9·6	5,409	15·3

SUMMARY TABLE SHOWING

Name of Breed.	December Quarter.	March Quarter.
White Leghorns, .	9·9	37·5
Brown Leghorns, .	2·5	35·6
Minorcas, . .	25·4	35·1
Buff Orpingtons, .	22·9	35·7
White Orpingtons, .	6·4	32·2
White Wyandottes,	8·6	25·3
Faverolles, . .	6·5	28·4
Plymouth Rocks, .	9·5	29·3
Rhode Island Reds .	12·8	35·6
Light Sussex, .	15·6	34·1
Red Sussex, .	5·0	27·5
Houdans, . .	12·2	34·2
Mixed Breeds .	10·8	31·6

YEAR 1913-14.

TABLE.

April.		May.		June.		July.		August.		September.		
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Total of Monthly Averages.
304	19·4	293	22·1	273	17·5	251	14·6	244	11·9	238	7·6	140·5
34	19·4	32	15·0	25	12·9	20	10·1	20	6·2	20	5·1	106·8
88	19·9	84	19·8	83	14·2	81	12·0	81	10·6	75	10·1	147·1
66	13·0	59	15·3	61	11·3	60	9·6	58	6·7	58	6·2	120·7
87	16·0	86	14·5	87	9·2	89	6.6	88	6·2	87	5·9	97·0
299	14·5	263	13·6	207	10·2	186	9·0	177	7·4	159	5·9	94·5
293	14·6	250	13·8	238	10·3	218	10.2	228	6·5	219	3·5	93·8
467	15·0	453	13·4	369	9·9	375	8·3	364	7·8	368	6·3	99·5
228	18·3	203	14·5	220	12·8	200	10·5	183	9·3	220	7·1	120·9
134	15·1	136	13·4	127	11·7	129	10·1	119	10·0	118	7·5	117·5
—	—	—	—	37	9·4	36	8·1	34	4·0	45	1·2	—
15	19·3	16	15·6	14	17·9	14	10·1	14	7·8	14	9·0	126·1
3,113	16·2	2,925	14·8	2,840	11·9	2,549	10·5	2,544	8·7	2.452	7·5	112·0
5,128	16·2	4,800	15·1	4,581	12·0	4,208	10·4	4,154	8·6	4.073	7·0	111·5

QUARTERLY AVERAGES, 1913-14.

June Quarter.	September Quarter.	Total for Year.
59·0	34·1	140·5
47·3	21·4	106·8
53·9	32·7	147·1
39·6	22·5	120·7
39·7	18·7	97·0
38·3	22·3	94·5
38·7	20·2	93·8
38·3	22·4	99·5
45·6	26·9	120·9
40·2	27·6	117·5
—	13·3	—
52·8	26·9	126·1
42·9	26·7	112·0

WHITE LEGHORNS.

Number.	October.		November.		December.		January.		February		March.	
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.
1	4	4·5	4	4·2	4	1·5	4	5·0	4	5·8	4	10·5
2	29	2·5	29	0·4	29	4·5	42	9·1	39	10·9	37	18·6
3	30	4·6	55	2·7	45	6·4	45	5·5	45	6·8	45	11·4
4	18	3·1	40	0·4	48	3·2	51	6·1	51	11·6	53	24·0
5	14	1·7	14	0·0	14	4·7	14	8·0	27	8·5	26	14·9
6	33	1·6	33	1·4	33	1·8	33	8·1	35	11·2	35	22·4
7	17	6·1	16	2·8	16	1·3	16	5·2	34	7·0	34	17·9
8	5	7·2	8	8·7	16	11·4	18	14·0	26	13·7	29	20·0
9	30	3·6	30	1·9	30	4·8	30	6·0	40	11·5	30	25·1
10	26	3·4	26	1·8	26	6·7	26	11·9	26	12·0	25	22·3
Totals,	206	3·4	255	1·8	261	4·7	279	7·8	327	10·2	318	19·5

BROWN LEGHORNS.

1	20	0·9	40	0·0	37	1·6	34	5·9	34	12·2	34	17·5

MINORCAS.

1	12	10·1	36	7·3	35	10·0	34	8·8	36	15·6	36	24·2
2	11	11·5	11	7·6	11	1·6	—	—	—	—	—	—
3	11	8·9	12	8·6	12	6·7	12	14·7	12	16·3	12	22·7
4	—	—	—	—	—	—	42	1·4	42	3·3	41	13·4
Totals,	34	10·1	59	7·6	58	7·7	88	6·1	90	10·0	89	19·0

BUFF ORPINGTONS.

1	40	8·0	44	7·5	40	10·7	45	9·1	45	11·2	40	16·9
2	6	0·0	6	0·0	6	6·2	6	14·2	6	5·3	6	11·5
3	28	6·9	28	3·4	28	11·5	28	10·2	28	9·4	28	14·9
Totals,	74	6·9	78	5·4	74	10·6	79	9·9	79	10·1	74	15·7

WHITE LEGHORNS.

April.		May.		June.		July.		August.		September.		
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Total of Monthly Averages
4	17·0	—	—	—	—	—	—	—	—	—	—	—
35	19·4	34	15·7	34	12·4	34	11·6	34	11·4	31	4·8	121·3
54	16·1	52	23·1	49	17·0	40	14·3	35	12·0	32	11·0	130·9
48	19·3	42	24·8	42	22·9	42	20·0	40	12·8	36	10·2	158·4
23	17·9	21	13·8	19	10·6	19	9·2	19	3·2	18	1·1	93·6
35	22·9	35	24·3	35	17·1	33	9·7	33	9·6	32	8·3	138·4
34	21·6	33	20·9	29	13·7	24	14·5	25	12·0	25	11·5	134·5
16	23·1	22	20·4	15	18·5	9	18·9	9	13·3	9	5·1	174·3
30	16·3	30	25·2	27	22·5	27	14·6	27	11·9	28	4·0	147·4
25	21·8	24	26·6	23	20·7	23	19·5	22	20·6	27	8·0	175·3
304	19·4	293	22·1	273	17·5	251	14·6	244	11·9	238	7·6	140·5

BROWN LEGHORNS.

34	19·4	32	16·0	25	12·9	20	10·1	20	6·2	20	5·1	106·8

MINORCAS.

36	23·2	36	21·7	36	17·1	36	16·9	36	11·6	30	12·2	178·7
—	—	—	—	—	—	—	—	—	—	—	—	—
12	19·2	12	17·7	12	16·6	10	10·9	10	16·5	10	13·2	172·0
40	17·3	36	18·6	35	10·4	35	7·3	35	7·9	35	7·5	—
88	19·9	84	19·8	83	14·2	81	12·0	81	10·6	75	10·1	147·1

BUFF ORPINGTONS.

38	12·2	35	16·6	37	9·5	40	8·4	38	8·8	38	8·5	127·4
—	—	—	—	—	—	—	—	—	—	—	—	—
28	13·9	24	13·4	24	14·2	20	12·0	20	2·8	20	1·8	114·4
66	13·0	59	15·3	61	11·3	60	9·6	58	6·7	58	6·2	120·7

WHITE ORPINGTONS.

Number.	October.		November.		December.		January.		February.		March.	
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen
1	23	3·5	34	2·7	33	3·6	33	8·7	32	11·8	24	16·8
2	36	0·9	33	0·5	33	0·4	30	1·1	30	4·8	30	14·1
3	28	1·8	34	2·2	34	4·0	35	8·9	35	14·0	35	15·3
Totals,	87	1·9	101	1·8	100	2·7	98	6·4	97	10·5	89	15·3

WHITE WYANDOTTES.

1	36	0·3	36	1·0	—	—	30	2·2	32	6·7	—	—
2	40	1·5	40	0·2	40	0·6	32	1·7	30	6·0	30	12·0
3	45	6·1	50	3·6	53	3·0	55	3·3	55	7·3	54	15·1
4	33	0·0	33	0·0	33	1·8	33	5·0	33	7·6	33	7·0
5	22	4·6	33	2·4	34	6·3	33	10·3	33	12·7	33	17·0
6	62	3·0	62	4·9	59	2·8	55	1·5	55	2·5	56	9·3
7	33	8·2	33	6·0	32	5·8	33	9·2	33	7·9	33	13·5
8	30	3·4	30	1·8	30	4·9	30	10·4	30	13·8	30	16·5
Totals,	301	3·4	317	1·8	281	3·4	301	5·0	301	7·6	269	12·7

FAVEROLLES.

1	35	1·9	35	0·0	45	0·0	—	—	—	—	—	—
2	23	0·5	23	0·0	32	0·0	32	5·1	31	7·5	30	14·0
3	20	0·0	32	2·4	30	2·0	30	3·5	32	5·8	32	7·5
4	25	0·8	22	0·0	25	0·6	25	1·6	25	2·9	24	16·3
5	20	3·0	20	2·2	20	3·0	20	4·3	20	8·0	20	15·1
6	28	1·6	27	1·9	40	3·9	40	4·7	40	10·2	40	14·8
7	30	3·7	30	4·1	30	13·4	30	8·4	30	10·6	30	15·4
8	35	1·0	60	0·6	60	3·5	70	6·3	66	8·3	66	14·8
9	20	1·6	23	0·2	40	4·7	39	10·5	41	9·0	41	15·7
10	5	0·4	5	7·8	5	14·2	5	11·2	5	9·6	5	14·6
11	9	1·6	9	1·3	9	3·9	9	10·0	9	6·2	9	15·0
Totals,	250	1·6	286	1·3	336	3·6	300	6·1	299	8·0	297	14·3

WHITE ORPINGTONS.

April.		May.		June.		July.		August.		September.		
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of H ns.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Total of Monthly Averages.
22	18·7	21	14·8	23	11·6	25	10·7	25	9·1	24	9·8	121·8
30	14·5	30	13·1	30	5·2	30	1·6	30	2·8	30	0·7	59·7
35	15·5	35	15·5	34	11·1	34	7·9	33	7·0	33	7·9	111·1
87	16·0	86	14·5	87	9·2	89	6·6	88	6·2	87	5·9	97·0

WHITE WYANDOTTES.

30	12·5	—	—	—	—	—	—	—	—	—	—	—
30	17·1	30	12·2	30	8·9	20	7·4	30	2·1	30	4·6	74·3
54	11·4	53	9·5	49	9·3	49	10·3	41	7·0	30	5·3	91·2
33	20·5	33	13·2	33	6·0	25	6·8	18	9·9	12	9·3	87·1
33	13·6	32	15·5	33	11·6	30	10·6	28	7·0	28	6·8	118·4
56	13·3	53	14·8	—	—	—	—	—	—	—	—	—
33	16·5	33	17·0	33	13·9	33	8·3	33	11·7	33	7·0	125·0
30	13·7	29	15·0	29	12·1	29	7·6	27	7·1	26	3·8	110·1
299	14·5	263	13·6	207	10·2	186	9·0	177	7·4	159	5·9	94·5

FAVEROLLES.

—	—	—	—	—	—	—	—	—	—	—	—	—
30	13·2	—	—	—	—	—	—	—	—	—	—	—
32	15·1	32	14·9	26	0·3	20	11·3	22	10·5	30	5·7	89·0
25	12·7	25	10·2	20	7·0	18	6·2	18	5·1	20	3·8	67·2
20	18·1	20	15·0	19	13·9	19	9·9	19	7·9	20	8·0	108·4
40	15·8	40	13·1	40	11·4	40	11·7	40	6·3	40	2·1	97·5
30	17·2	25	19·1	25	14·0	35	10·2	33	6·5	32	0·7	123·3
66	14·1	57	14·7	57	10·1	37	8·8	50	2·8	37	1·2	86·2
42	12·4	42	11·2	42	8·0	40	8·5	37	7·7	31	2·0	91·5
—	—	—	—	—	—	—	—	—	—	—	—	—
8	16·3	9	12·1	9	7·4	9	21·4	9	13·6	9	1·6	110·4
293	14·6	250	13·8	238	10·3	218	10·2	228	6·5	219	3·5	93·8

PLYMOUTH ROCKS.

Number.	October.		November.		December.		January.		February.		March.	
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.
1	36	0·1	33	0·9	40	2·9	40	7·1	40	6·6	40	9·9
2	8	2·9	8	0·0	11	0·0	11	9·4	11	9·5	11	11·8
3	32	8·2	36	9·6	36	6·6	36	7·1	32	7·5	32	10·0
4	25	0·0	25	5·0	26	7·6	26	10·6	27	15·0	25	21·8
5	39	6·9	39	2·2	40	1·3	40	2·6	39	7·9	39	18·9
6	21	2·1	22	0·6	22	0·9	22	4·0	22	11·5	22	18·0
7	25	7·1	29	3·9	33	3·7	33	4·1	34	6·8	34	13·0
8	35	2·2	44	1·3	45	1·4	45	3·9	45	6·5	45	14·2
9	33	0·2	33	1·2	33	2·6	33	3·5	33	4·3	33	9·1
10	20	0·5	40	0·0	30	0·0	38	4·4	40	8·5	30	16·3
11	25	10·5	31	5·3	31	8·0	31	3·8	31	11·6	31	13·5
12	30	2·9	33	2·1	30	2·5	40	5·1	30	9·1	30	13·7
13	32	1·0	30	1·2	30	4·1	29	8·9	28	12·7	24	16·1
14	48	2·4	48	1·8	48	5·0	48	7·0	62	10·7	62	21·2
15	17	7·6	31	0·3	31	1·5	41	3·0	30	7·5	30	15·4
Totals,	426	3·5	482	2·6	486	3·4	513	5·3	504	8·9	488	15·1

RHODE ISLAND REDS.

1	32	7·3	33	3·5	33	6·2	35	7·5	34	8·9	33	19·5
2	24	5·6	26	4·4	24	7·0	24	9·0	23	15·0	22	17·3
3	40	5·9	40	5·1	40	5·8	40	8·9	42	13·0	42	20·4
4	14	4·7	12	0·4	20	0·6	21	3·1	21	6·5	21	13·4
5	19	3·0	13	0·5	19	0·7	20	4·4	20	11·5	21	14·0
6	16	1·9	10	1·2	10	5·7	10	7·5	10	6·5	10	10·3
7	—	—	—	—	25	2·8	25	10·0	25	11·5	25	18·2
8	25	5·2	25	3·4	25	2·9	26	4·8	26	8·5	26	17·3
9	—	—	—	—	—	—	30	14·9	30	9·1	30	17·0
Totals.	170	5·2	159	3·4	196	4·2	231	8·1	231	10·2	230	17·3

LIGHT SUSSEX.

1	18	9·4	28	2·4	28	5·2	30	7·7	30	10·3	30	13·8
2	14	4·5	20	1·8	20	5·0	20	5.1	20	8·5	20	13·4
3	20	5·3	20	7·1	20	7·4	20	11·1	20	12·1	20	14·2
4	36	5·3	36	3·8	36	4·5	40	6·1	40	7·2	40	11·5
5	25	6·8	25	3·7	25	7·2	25	15·6	25	17·0	25	22·4
Totals,	113	6·2	129	3·7	129	5·7	135	8·8	135	10·6	135	14·7

PLYMOUTH ROCKS.

April.		May.		June.		July.		August.		September.		
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Total of Monthly Averages.
40	12·4	40	9·5	40	6·1	38	3·2	36	1·0	36	1·2	60·9
11	13·5	10	10·5	10	4·3	10	6·2	10	3·6	10	6·2	77·9
—	—	—	—	—	—	—	—	—	—	—	—	—
24	19·0	27	16·8	26	13·1	27	8·9	26	13·1	26	13·2	144·1
38	18·3	35	14·3	35	9·0	35	9.0	30	8·2	30	7·1	105·7
22	16·0	22	16·3	22	10·0	22	5·9	22	5·3	22	7·6	98·2
32	9·8	32	9·3	32	2·7	32	4·3	32	4·0	32	3·9	72·6
45	11·0	45	8·5	34	13·1	33	14·2	44	13·7	47	4·4	94·4
33	12·2	33	11·5	33	7·3	30	4·4	27	3·1	27	2·8	62·2
38	12·3	35	9·0	—	—	—	—	—	—	—	—	—
31	13·9	31	14·6	19	17·6	19	16·3	19	12·8	19	13·3	141·4
30	17·7	30	14·6	—	—	—	—	—	—	—	—	—
30	13·8	24	17·5	30	10·7	30	9·5	20	6·2	18	2·3	104·0
63	21·3	62	21·5	62	13·1	74	10·6	72	9·4	77	5·5	129·5
30	15·5	27	9·0	26	9·9	25	5·0	26	9·3	24	15·7	99·7
467	15·0	453	13·4	369	9·9	375	8·3	364	7·8	368	6·3	99·5

RHODE ISLAND REDS.

33	23·9	34	17·5	30	12·3	22	11·5	3	0·0	33	0·2	118·3
21	19·1	21	18·8	21	14·9	19	12·5	19	11·2	24	9·5	144·3
42	19·9	42	10·4	42	13·8	39	10·8	40	10·9	42	9·0	133·9
21	13·6	20	17·5	20	12·7	20	10·2	20	3·8	22	5·0	91·5
21	15·7	21	10·2	20	6·6	20	9·5	19	12·5	19	7·1	95·7
9	19·4	9	8·7	9	4·6	9	4·4	9	9·3	9	7·1	86·6
25	18·4	—	—	25	15·0	25	11·1	27	7·7	31	5·5	—
26	17·9	26	15·1	26	13·0	26	7·3	26	6·6	20	12·5	114·5
30	18·0	30	15·8	27	14·9	20	14·0	20	13·0	20	11·4	—
228	18·3	203	14·5	220	12·8	200	10·5	183	9·3	220	7·1	120·9

LIGHT SUSSEX.

28	10·8	28	11·2	20	9·8	20	8·9	20	6·1	20	4·0	99·6
20	11·4	20	11·0	20	3·7	20	5·8	16	5·9	16	5·3	81·4
20	15·3	22	13·9	22	13·3	26	11·0	20	10·9	22	6·4	128·0
40	15·2	40	11·7	40	11·4	40	8·5	40	11·7	40	9·4	106·3
26	22·5	26	20·0	15	18·7	23	16·7	23	12·5	20	9·5	172·6
134	15·1	136	13·4	127	11·7	129	10·1	119	10·0	118	7·5	117·5

RED SUSSEX.

Number.	October.		November.		December.		January.		February.		March.	
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.
1	7	0·0	7	0·3	7	4·7	7	10·9	7	6·9	7	9·7
2	—	—	—	—	—	—	—	—	—	—	—	—
Totals	7	0·0	7	0·3	7	4·7	7	10·9	7	6·9	7	9·7

HOUDANS.

1	14	4·1	14	4·5	14	7·9	14	10·9	15	11·3	15	17·8
2	5	0·0	5	0·0	5	0·0	4	0·0	4	0·8	3	11·0
Totals.	19	3·1	19	3·3	19	5·8	18	8·4	19	9·1	18	16·7

MIXED BREEDS.

1	110	4·7	90	0·2	100	0·0	90	2·3	82	7·0	70	15·1
2	34	2·7	34	0·9	32	1·5	30	3·1	27	7·8	23	15·1
3	35	4·7	45	5·0	45	4·8	45	4·8	43	6·5	45	12·2
4	18	3·3	18	3·7	24	5·8	30	4·2	29	3·9	24	6·9
5	73	3·0	69	2·1	60	4·3	60	6·1	63	10·4	80	13·9
6	34	9·9	40	1·7	38	1·2	52	6·4	43	7·0	42	8·0
7	85	3·0	85	4·5	86	6·2	87	7·4	90	7·6	90	11·8
8	55	3·8	55	0·7	55	2·9	55	5·7	55	17·5	55	20·1
9	52	9·5	50	4·5	50	6·4	60	11·0	60	16·2	60	22·5
10	42	1·6	49	1·0	48	3·8	48	3·8	52	4·0	49	6·6
11	40	5·1	40	2.7	40	4·0	50	6·7	50	9·1	50	13·0
12	24	10·2	24	6·1	24	3·1	24	7·0	29	10·6	33	16·7
13	70	4·7	66	1·6	66	3·1	66	7·7	66	11·6	66	16·1
14	60	2·1	58	0·1	64	0·0	—	—	40	0·5	54	15·3
15	23	0·9	41	1·8	40	3·5	40	7·2	40	9·6	40	12·2
16	38	3·8	38	6·4	38	9·2	42	10·6	41	16·4	42	18·6
17	35	4·4	35	2·0	38	7·6	47	7·3	42	14·4	50	18·7
18	103	4·1	—	—	—	—	70	13·1	70	12·2	70	14·1
19	34	5·3	35	3·7	55	3·4	52	10·1	53	1·6	55	19·5
20	47	3·3	48	0·9	52	3·4	66	6·4	59	9·2	58	12·4
21	66	2·4	66	0·6	50	1·9	50	3·1	50	15·3	60	18·7
22	24	2·9	13	10·0	25	9·2	25	9·4	25	11·2	24	17·7
23	61	1·4	61	2·0	37	7·0	37	9·8	37	11·4	37	13·3
24	46	3·1	83	0·7	81	0·3	72	0·4	69	3·0	67	9·4
25	18	2·5	14	4·6	14	4·4	14	10·5	16	9·4	—	—
26	44	1·1	30	1·0	40	3·0	54	3·1	53	6·7	54	11·2
27	52	4·4	66	1·8	65	2·8	63	6·0	55	7·7	40	18·2
28	32	4·9	32	3·4	31	5·2	34	7·3	36	9·9	36	15·2
29	60	9·4	60	6·1	60	4·7	60	7·7	75	10·0	65	17·8
30	29	2·8	25	4·1	29	9·2	31	6·5	34	11·1	49	13·4
31	38	3·3	35	2·1	56	5·2	60	6·8	55	11·8	53	19·2
32	24	5·4	22	7·6	21	6·9	21	14·0	21	13·3	19	15·7

RED SUSSEX.

April.		May.		June.		July.		August		September.		
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Total of Monthly Averages.
—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	37	9·4	36	8·1	34	4·0	45	1.2	—
—	—	—		37	9·4	36	8·1	34	4·0	45	1·2	—

HOUDANS.

15	19·3	16	15·6	14	17·9	14	10·1	14	7·8	14	9·0	136·2
—	—	—	—	—	—	—	—	—	—	—	—	—
15	19·3	16	15·6	14	17·9	14	10·1	14	7·8	14	9·0	126·1

MIXED BREEDS.

65	16·4	63	15·2	61	14·5	57	16·3	58	11·1	45	15·3	118·1
27	11·7	25	14 0	24	12·7	22	7·6	20	5·8	20	5·0	87·9
40	16·3	44	16·1	58	10·2	54	8·1	48	4·9	41	6·6	100·2
—	—	16	13·6	25	2·5	—	—	—	—	—	—	—
79	14·4	76	15·0	72	10·9	68	11·5	67	6·8	67	6·1	104·5
49	7·1	43	7·9	40	8 6	42	7·8	43	7·7	45	2·0	75 3
60	17·7	60	15·2	60	15·0	—	—	—	—	—	—	—
55	18·6	55	14·5	57	14·8	60	14·2	55	14·9	60	5·8	133·5
60	21·8	60	23·5	60	21·3	60	17·7	60	13·4	60	9·6	177·4
52	7·8	60	7·3	64	5·7	56	5·6	56	8·7	56	7·5	63·4
50	17·7	50	17·6	40	18·4	47	9·1	50	8·2	47	5·6	117·2
34	17·7	36	12·9	37	12·1	37	5·2	37	4·5	27	12·5	118·6
66	16·2	66	15·4	66	13·4	66	11·8	70	12·7	54	14·7	129·0
54	14·1	60	2·2	60	2 1	—	—	—	—	58	0·9	—
37	15·1	35	14·7	35	11·8	35	10·5	34	8·5	34	7·9	103·7
40	21·0	40	21·9	40	16·9	38	10·7	38	5·6	38	6·6	147·7
48	18·0	40	16·6	40	13·0	40	9·3	40	6·0	40	5·0	122·3
—	—	—	—	—	—	—	—	—	—	—	—	—
57	17·2	57	17·5	56	13·3	55	13·9	50	13·8	50	14·8	134·1
57	13·9	57	8·8	57	4·2	57	1·5	57	2·1	52	6·2	72·3
60	18·7	60	15·0	50	17·4	40	18·4	60	10·5	60	5·4	127·4
25	17·4	26	14·2	—	—	—	—	—	—	—	—	—
36	12·9	40	10·2	40	10 2	40	7·3	40	6·3	39	8·1	99·0
61	15·0	55	9·7	55	11·9	55	10·4	55	0·0	50	5·2	69·1
—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—
37	18·8	33	16·6	34	15·7	32	13·9	34	10·0	34	7·1	125·8
35	15·5	30	12·6	29	9·4	28	8·8	29	9·4	29	7·9	109·5
60	22·7	70	19·7	75	13·8	75	15·7	75	15·6	70	11·5	154·7
45	14·5	40	10·0	32	5·9	30	10·1	30	9·2	30	10·0	106·8
50	20·4	50	17·7	50	17·1	—	—	—	—	—	—	—
19	17·4	19	13·9	19	11·4	19	11·4	25	7·0	25	7·8	131·8

MIXED BREEDS—*continued.*

Number.	October. Number of Hens.	October. Average Number of Eggs laid per Hen.	November. Number of Hens.	November. Average Number of Eggs laid per Hen.	December. Number of Hens.	December. Average Number of Eggs laid per Hen.	January. Number of Hens.	January. Average Number of Eggs laid per Hen.	February. Number of Hens.	February. Average Number of Eggs laid per Hen.	March. Number of Hens.	March. Average Number of Eggs laid per Hen.
33	84	2·2	80	0·5	79	1·7	77	4·3	76	7·4	74	13·1
34	28	5·1	36	2·6	30	2·5	30	7·1	30	11·6	29	18·0
35	39	4·0	33	3·6	30	7·0	28	9·8	30	12·2	31	16·4
36	81	7·1	84	3·6	93	4·7	92	6·2	97	12·8	93	18·7
37	90	1·3	81	1·4	91	1·6	101	2·2	88	5·3	85	12·3
38	36	2·4	33	0·6	26	0·5	25	4·5	26	15·2	26	20·1
39	60	4·1	50	0·0	48	4·4	48	9·8	48	10·2	42	14·0
40	50	6·4	50	5·9	60	7·6	50	10·9	60	10·6	62	15·1
41	27	2·8	40	2·5	48	1·9	46	3·3	45	7·2	45	10·3
42	40	2·2	30	3·3	30	7·1	30	14·8	55	11·1	50	16·1
43	40	2·5	25	2·4	25	5·7	35	6·9	37	7·3	42	10·3
44	52	4·0	50	2·7	44	2·9	44	4·8	43	7·1	43	11·1
45	31	7·9	30	1·6	30	5·8	28	5·9	32	11·0	45	14·4
46	77	2·7	81	3·2	90	4·7	97	5·5	105	7·3	105	14·4
47	48	0·5	48	2·4	48	0·0	36	8·0	30	13·6	33	12·5
48	50	5·1	60	5·4	70	4·6	80	7·5	70	10·5	60	18·4
49	27	6·4	27	3·0	26	3·1	18	18·0	18	18·3	—	—
50	60	2·2	60	5·1	60	7·6	68	10·0	78	9·9	70	14·9
51	110	3·0	110	0·4	110	1·0	100	4·6	100	5·8	100	14·8
52	68	3·0	80	2·4	89	4·7	99	5·1	84	10·0	70	19·4
53	17	2·2	17	1·6	16	4·0	16	4·6	14	8·8	14	14·9
54	20	3·5	19	4·4	21	11·5	26	12·0	26	13·5	27	19·0
55	46	8·9	44	8·0	44	9·1	44	15·0	44	16·7	43	20·9
56	33	0·4	36	0·4	30	2·6	34	1·9	38	3·9	34	12·6
57	46	5·6	37	8·5	49	6·0	53	7·7	57	11·6	62	15·0
58	26	5·1	24	2·7	24	2·7	24	4·5	24	5·8	22	13·7
59	47	3·2	47	0·7	65	1·8	64	4·2	60	6·8	59	10·2
60	70	11·9	80	5·1	80	8·6	80	13·7	86	17·0	86	12·3
61	50	0·0	50	1·6	50	2·5	50	7·4	50	11·1	50	12·1
62	20	9·1	20	1·2	20	2·2	20	7·7	19	9·9	18	17·2
63	30	3·6	30	2·1	46	3·7	46	7·0	47	12·2	58	16·7
64	23	2·7	22	2·7	22	7·0	20	8·8	20	11·7	20	14·9
65	—	—	5	16·6	14	14·3	18	13·3	7	11·6	7	15·1
66	22	1·4	22	1·3	28	2·2	28	2·6	—	—	—	—
67	36	4·5	35	1·4	36	0·5	38	1·6	33	4·4	—	—
68	—	—	—	—	—	—	72	6·4	71	9·2	70	19·7
69	—	—	—	—	—	—	29	14·0	29	14·7	29	16·6
70	—	—	—	—	—	—	—	—	45	8·9	47	14·3
71	—	—	—	—	—	—	—	—	—	—	50	14·5
Totals,	3,090	4·1	3,003	2·7	3,096	4·0	3,329	6·8	3,392	9·9	3,361	14·9

MIXED BREEDS—*continued.*

April.		May.		June.		July.		August.		September.		
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Total of Monthly Averages.
71	16·8	...	—	—	—	—	—	—	—	—	—	—
25	20·0	25	17·2	25	11·6	25	10·4	25	6·0	25	5·4	117·5
31	17·1	30	15·4	30	11·7	28	10·3	30	6·2	29	3·6	117·3
92	19·3	90	19·1	88	15·7	85	14·5	79	14·5	73	10·9	147·1
82	11·1	82	14·8	82	7·6	90	6·8	88	3·6	100	2·0	70·0
39	12·4	25	15·6	26	11·2	25	5·0	44	2·2	26	3·8	93·5
42	19·2	42	15·4	42	10·8	36	13·7	36	7·3	36	7·5	116·4
60	13·3	60	14·2	60	11·8	50	13·8	50	12·6	50	6·9	129·1
42	13·3	40	11·9	37	9·1	35	9·5	34	9·3	35	4·6	85·7
50	13·4	50	13·4	50	12.2	49	9·3	48	7·0	40	6·5	116·4
40	13·0	40	5·1	40	4·0	36	2·4	45	5·8	40	7·2	72·6
38	15·3	30	9·4	35	11·2	20	16·1	16	16·0	16	7·5	108·1
44	18·0	43	20·1	43	15·7	41	13·8	40	12·1	38	11·9	138·2
108	14·8	86	16·2	83	14·3	82	13·3	81	10·6	81	8·0	115·0
24	15·4	44	7·5	28	5·3	...	—	—	—	—	—	—
70	16·2	50	13 4	70	9.1	60	6·6	60	3·0	70	4·1	103·9
—	—	...	—	—	—	...	—	—	—	—	—	—
70	16·1	...	—	—	—	...	—	—	—	—	—	—
120	18·5	120	13·5	120	8·8	120	8·2	100	5·2	90	6·3	90·1
70	21·7	60	24·6	60	15·3	90	10·7	68	10·1	61	8·6	135·6
11	18·1	10	14·4	12	12·5	12	5·3	—	—	—	—	—
24	19·2	23	18·3	22	16·8	22	8·5	20	8·4	19	3·8	138·9
41	22·6	40	23·2	38	17·0	37	17·5	36	16·6	41	13·3	188·8
32	15·4	33	8·9	30	5·3	32	6·1	32	10·7	36	8·8	77·0
65	15·4	65	14·8	62	12·4	52	9·5	52	8·6	50	8·2	123·3
17	12·4	17	15·1	16	13·0	12	12·7	12	15·6	12	11·5	114·8
—	...	—	—	—	—	...	—	—	—	—	—	—
90	22·2	90	17·2	90	12·5	90	9·0	90	8·4	90	7·2	145·1
64	7·7	64	11·1	71	9·9	59	12·9	48	12·6	49	8·7	97·6
20	14·8	20	15·6	14	13·7	13	9·1	13	9·6	15	9·5	109·6
57	16·6	57	16·4	56	11·3	56	10·3	50	12·3	50	7·5	119·7
20	17·7	20	14·8	20	15·5	18	11·9	18	11·4	14	16·2	135·3
—	—	6	21·3	7	14·9	13	15·0	13	15·6	14	5·1	—
—	—	...	—	—	—	...	—	—	—	—	—	—
—	—	—	—	...	—	—	—	—	—	—	—	—
70	15·9	70	14·5	70	14·2	70	6·3	70	6·0	70	2·5	—
29	12·8	29	17·9	29	11·7	30	10·1	29	7·2	28	8·0	—
48	15·8	49	15·7	48	13·3	48	11·4	36	8·8	23	11·1	—
49	13·4	49	14·6	—	—	—	—	50	4·9	—	—	—
3,113	16·2	2,925	14·8	2,840	11·9	2,549	10·5	2,544	8·7	2,452	7·5	112·0

OFFICIAL DOCUMENTS.

I.—ADMINISTRATIVE.

ORDER

OF THE DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

(*Dated 21st September*, 1914.)

BLACK SCAB IN POTATOES (SPECIAL AREA, IRELAND) No. 2 ORDER, 1914.

The Department of Agriculture and Technical Instruction for Ireland, by virtue and in exercise of the powers vested in them under the Destructive Insects and Pests Acts, 1877 and 1907, do order, and it is hereby ordered, as follows :—

RESTRICTION OF MOVEMENT OF POTATOES OUT OF SCHEDULED DISTRICT.

1. Excepting potatoes shipped from Annalong, Kilkeel, Greencastle, and Rostrevor, potatoes shall not be moved out of the district described in the First Schedule to this Order (hereinafter referred to as the scheduled district) otherwise than under and subject to the conditions of a licence authorising such movement.

CERTIFICATES ; PRODUCTION OF CERTIFICATES ; NAMES AND ADDRESSES.

2. (1) Potatoes shall not be loaded on any vessel at, or be moved from, the ports of Annalong, Kilkeel, Greencastle, or Rostrevor unless the person causing, directing or permitting the potatoes to be so loaded, or the person causing, directing or permitting the potatoes to be so moved shall have obtained a certificate in the prescribed form stating that the potatoes are free from the disease known as Black Scab, Wart or Warty Disease, Cauliflower Disease, Potato Canker, or Potato Rosette (and caused by the fungus known as *Chrysophlyctis endobiotica* [Schilb] or *Synchitrium endobioticum* [Perc].)

(2) Any person causing, directing or permitting potatoes to be loaded or moved as aforesaid shall, on demand of a Justice or of a constable or of an inspector or of any authorised officer, or of the master of any vessel on which potatoes have been or are about to be loaded, produce and show to him the aforesaid certificate and shall allow it to be read and a copy of, or extract from, it to be taken by the person to whom it is produced.

(3) Any person in charge or in possession of potatoes loaded or in the course of being loaded on any vessel at the aforesaid ports in contravention of this Order, or of any potatoes moved in contravention of this Order shall, on demand of a Justice or of a constable

or of an inspector or of any authorised officer, give his name and address and all the information in his possession as to the person causing, directing, or permitting the potatoes to be so loaded or moved.

RESTRICTION ON PLANTING, DIGGING AND MOVING POTATOES WITHIN PROHIBITED AREAS.

3. Within the areas described in the Second Schedule to this Order (hereinafter referred to as the prohibited areas) potatoes shall not be planted, dug or otherwise raised out of the ground, or moved from any field, plot, pit, shed, outhouse or other place on or used in connection with any farm, garden or agricultural holding otherwise than under and in accordance with the conditions of a licence authorising the planting, digging or raising out of the ground, or movement of the said potatoes.

RESTRICTION ON PLANTING OF POTATOES WITHIN SCHEDULED DISTRICT.

4. Potatoes shall not be planted on any land forming part of any field, plot, or other place on which potatoes have previously been grown, outside the prohibited areas but otherwise within the scheduled district, unless a period of at least five years shall have elapsed since potatoes were previously planted on the said land, or until a licence authorising the planting of potatoes on the said land has been obtained by the occupier of the said land ; in the latter case potatoes shall not be planted except in accordance with the conditions, if any, specified in the said licence.

PROHIBITION OF USE FOR SEED PURPOSES OF POTATOES GROWN WITHIN AREAS OR SCHEDULED DISTRICT.

5. (1) Potatoes grown within the prohibited areas shall not be supplied or used for planting.

(2) Potatoes grown outside the prohibited areas but otherwise within the scheduled district shall not be supplied or used for planting elsewhere than in that district.

DISPOSAL OF POTATOES PLANTED IN CONTRAVENTION OF THE ORDER.

6. If an Inspector or any authorised officer has reason to believe that potatoes planted on any land have been so planted in contravention of this Order or in contravention of the conditions inserted in a licence thereunder, he may serve a Notice on the occupier of the land requiring him to dig or otherwise raise out of the ground the said potatoes, and to dispose of the same in such manner and within such period of time as may be prescribed in the Notice by the inspector or authorised officer.

PROHIBITION OF MOVEMENT OF POTATO STALKS, ETC., GROWN WITHIN PROHIBITED AREAS.

7. Potato stalks and leaves or portions thereof grown within the prohibited areas shall not be moved out of the field, plot, or other place on which they have been grown, but shall be destroyed by burning or shall be ploughed into the land by the occupier of the said

field, plot, or other place within such period as may be notified in writing to the occupier by an inspector or by any authorised officer.

DESTRUCTION OF "GROUND" POTATOES.

8. The occupier of any land which is not cropped with potatoes for the time being, but which having been so cropped at a previous period contains a more or less number of potato tubers which were not removed from the ground when the crop was raised, shall prevent the growth of the said tubers by pulling or digging up the potato stalks as they appear above ground.

RESTRICTION ON USE OF POTATOES WITHIN PROHIBITED AREAS.

9. Within the prohibited areas uncooked potatoes or portions thereof shall not be supplied or used either alone or mixed with other materials as food for stock or poultry, or be spread on the land or used as a manure or put into or upon any manure heap.

PROHIBITION OF USE AS MANURE OF CERTAIN SUBSTANCES WITHIN PROHIBITED AREAS.

10. Within the prohibited areas it shall not be lawful to supply or to use as manure, or to spread on the land, or to put into or upon any manure heap, either alone or mixed with other material :—

(*a*) any cinders or any ashes ; or
(*b*) any contents of ashpits ; or
(*c*) any cleanings or any sweepings of potato houses or of potato stores or of potato pits.

PROHIBITION OF USE AS MANURE OF CERTAIN SUBSTANCES WITHIN SCHEDULED DISTRICT.

11. Outside the prohibited areas, but otherwise within the scheduled district, it shall not be lawful to supply or to use as manure, or to spread on the land, or to put into or upon any manure heap, either alone or mixed with other material, any refuse or any other substance coming or obtained from any premises situated within the prohibited areas, consisting wholly or in part of any of the following :—

(*a*) any cinders or any ashes ; or
(*b*) any contents of ashpits ; or
(*c*) any cleanings or any sweepings of potato houses or of potato stores or of potato pits.

PRODUCTION OF LICENCES ; NAMES AND ADDRESSES.

12. (1) Any person in charge or in possession of potatoes which are being moved, supplied, used, planted, dug or otherwise raised out of the ground where, under this Order, a licence is necessary shall, on demand of a Justice or of a constable or of an inspector or of any authorised officer, produce and show him the licence and shall allow it to be read and a copy of, or extract from, it to be taken by the person to whom it is produced.

(2) Any person in charge or possession of potatoes suspected by a Justice or by a constable or by an Inspector or by any authorised officer of being or having been moved, supplied, used, planted, dug or otherwise raised out of the ground, without a licence in

contravention of this Order shall, on demand as aforesaid, give his name and address and all the information in his possession as to the persons in whose charge or possession the potatoes have been and as to the place where the potatoes were grown or loaded.

SPECIAL LICENCES.

13. Notwithstanding anything in this Order contained, any potatoes, potato peelings, potato stalks, potato leaves or portions thereof, cinders or ashes, contents of ash pits, or cleanings or sweepings of potato houses or of potato stores or of potato pits, may be moved, supplied, used or dealt with in any manner specified in any licence granted by an inspector or by any authorised officer.

POWERS OF ENTRY AND INSPECTION.

14. Any Justice, constable, inspector or any authorised officer, upon production, if so required, of his appointment or authority may, for the purpose of enforcing this Order, or of detecting any violation of the provisions thereof, enter any premises, or any ship, boat or other vessel or craft, and examine and take samples of any potatoes therein.

LICENCES AND CERTIFICATES.

15. (1) Licences and certificates under this Order may be granted by any inspector or by any authorised officer.

(2) Every licence and certificate issued under this Order shall be delivered up to the Department in the manner prescribed on said licence or certificate as soon as the purpose for which it was issued has been carried out or the time for which it is valid has elapsed.

(3) Any erasure or alteration made in a licence or certificate shall render it invalid.

OFFENCES AND PENALTIES.

16. If any person—

(*a*) moves any potatoes, potato peelings, potato stalks, potato leaves, or portions thereof, or causes, directs or permits the same to be moved, in contravention of this Order or in contravention of the conditions inserted in any licence thereunder; or

(*b*) loads any potatoes, potato peelings, potato stalks, potato leaves, or portions thereof, on any ship, boat or other vessel or craft; or causes, directs or permits the same to be so loaded, in contravention of this Order or in contravention of the conditions inserted in any licence thereunder; or

(*c*) plants any potatoes or digs or raises any potatoes out of the ground; or causes, directs, or permits the same to be dug, planted, or raised in contravention of this Order, or in contravention of the conditions inserted in any licence thereunder; or

(*d*) refuses or neglects to comply with any direction contained in a Notice served on him under this Order; or

(*e*) refuses or neglects to destroy any potato stalks, potato leaves, or portions thereof, either by burning or by digging or ploughing the same into the land; or causes, directs or permits the same to remain undestroyed as aforesaid in contravention of this Order; or

(*f*) refuses or neglects to prevent in the manner prescribed in Article 8 of this Order the growth of certain potatoes in contravention of this Order or in contravention of the conditions inserted in any licence thereunder; or

(*g*) uses as food for stock or poultry or as manure, or puts into any manure heap, or spreads on any land any potatoes, potato peelings, potato stalks, potato leaves or portions thereof; or causes, directs or permits the same to be used as food for stock or poultry, or as manure, or to be put in any manure heap or spread on any land, in contravention of this Order or in contravention of the conditions inserted in any licence thereunder; or

(*h*) supplies or uses as manure, or puts into or upon any manure heap, or spreads on any land, any of the substances mentioned in Articles 10 and 11 of this Order, or causes, directs or permits the same to be supplied or used as aforesaid in contravention of this Order, or in contravention of the conditions inserted in any licence thereunder; or

(*i*) refuses or neglects to produce and show any licence or certificate or refuses to allow it to be read and a copy of or extract from it to be taken as required by this Order when called upon to do so by any of the persons set out in Articles 2 (2) and 12 (1) of this Order; or

(*j*) refuses or neglects to give his true name and address or gives a false name or address to any of the persons set out in Articles 2 (3) and 12 (2) of this Order; or

(*k*) refuses or neglects to give to any of the persons set out in Articles 2 (3) and 12 (2) of this Order or to the Department when required to do so the information required said Articles; or

(*l*) obstructs or impedes any inspector or any authorised officer in discharge of his duty under this Order; or

(*m*) refuses or neglects to deliver up any licence or certificate in contravention of Article 15 of this Order; or

(*n*) is guilty of any other act or default in contravention of the provisions of this Order;

he shall be guilty of an offence and shall be liable on conviction to a penalty not exceeding ten pounds for each offence.

Execution of the Order.

17. For the purposes of this Order a Notice shall be deemed to be served on a person if it is delivered to him personally or left for him at his last known place of abode, or at his office or place of business, or sent through the post in a letter addressed to him at either of such addresses, and a Notice or other document purporting

to be signed by an inspector or any authorised officer shall be *prima facie* evidence that it was signed by such inspector or such authorised officer as the case may be and duly authorised.

Definitions.

18. In this Order—

"The Department" means the Department of Agriculture and Technical Instruction for Ireland.

"Inspector" means an Inspector of the Department.

"Authorised Officer" means any person authorised by the Department.

"Premises" means land, or a building or buildings, or land with a building or buildings thereon.

"Occupier" means any person using land for the purpose of or in connection with growing potatoes thereon, whether he has an estate in said lands or not.

"Prescribed" means prescribed by the Department.

Commencement.

19. This Order shall come into operation on the Twenty-first day of September, Nineteen Hundred and Fourteen.

Short Title.

20. This Order may be cited as the Black Scab in Potatoes (Special Area, Ireland) No. 2 Order, 1914.

Revocation of Previous Orders.

21. The Orders described in the Third Schedule to this Order are hereby revoked as from the Twenty-first day of September, Nineteen Hundred and Fourteen; provided that such revocation shall not—

(i.) affect the previous operation of those Orders or anything duly done or suffered under those Orders; or

(ii.) affect any right, privilege, obligation, or liability acquired, accrued, or incurred under those Orders; or

(iii.) affect any penalty incurred in respect of any offence committed against those Orders; or

(iv.) affect any investigation, legal proceeding, or remedy in respect of any such right, privilege, obligation, liability, or penalty as aforesaid;

and any such investigation, legal proceeding, or remedy may be instituted, continued or enforced, and any such penalty may be imposed, as if this Order had not been made.

In Witness whereof the Department of Agriculture and Technical Instruction for Ireland have hereunto set their Official Seal this Twenty-first day of September, Nineteen Hundred and Fourteen.

T. P. GILL,
Secretary.

[L.S.]

FIRST SCHEDULE.

SCHEDULED DISTRICT.

A District comprising :—

The townlands of Ballincurry, Ballindoalty, Ballyedmond, Ballyneddan, Ballinran, Ballintur, Kilfeaghan, Kilfeaghan Upper, and Tamnyveagh, all in the Barony of Iveagh Upper, Upper Half, in the administrative County of Down; and the townlands of Aghyoghill, Attical, Aughnahoory, Aughnaloopy, Aughrim, Mourne Mountains West, Lisnacree Upper, Lisnacree, Ballymadeerfy, Glenloughan, Glenloughan Upper, Tullyframe, Maghery, Drummanlane, Ballygowan, Benagh Upper, Benagh Lower, Greencastle, Cranfield, Grange, Lurganconary, Lurganreagh, Drummanmore, Corcreaghan, Ballymagart, Mourne Park or Ballyrogan, Ballymageogh, Mourne Mountains Middle, Drumindoney, Ballyardel, Ballynahatten, Dunnaval, Derryoge, Dunnaman, Drumcro, Leitrim, Leitrim Upper, Ballinran Upper, Ballinran, Kilkeel including Kilkeel town, Magheramurphy, Maghereagh, Ballykeel, Carrigenagh, Carringenagh Upper, Brackenagh West Upper, Brackenagh West, Brackenagh East Upper, Brackenagh East, Ballymartin, Ballyveagh Beg, Ballyveagh Beg Upper, Ballyveagh More, Ballyveagh More Upper, Moneydorragh More Upper, Moneydorragh More including the town of Annalong, Moneydorragh Beg, Mullartown, Glasdrumman, Ballaghanery, Ballaghanery Upper, Guineways, Guineways Upper, Moyad Upper, Moyad, all in the Barony of Mourne in the Administrative County of Down; and the Rostrevor Quay and the direct road leading thereto from the townland of Ballinran in the Barony of Iveagh Upper, Upper Half, in the Administrative County of Down.

SECOND SCHEDULE.

PROHIBITED AREAS.

1. A District comprising :—

Such parts of the Administrative County of Down as lie within the following boundary (the roads mentioned as forming the boundary being regarded as outside the prohibited area) :—

Commencing at the point (near Mr. O'Hagan's farm) on the coast where the boundary between the Townlands of Ballynahatten and Cranfield in the Barony of Mourne begins, thence by the aforesaid boundary to the point where it meets the main road near Mourne Wood demesne, thence by the direct road passing Mourne Wood gate lodge to Ballyardel crossroads, thence by the direct road *via* Belhill to Newry main road, thence by the direct road to Mr. Doran's shop, thence by the direct road *via* Massfort Chapel to Hilltown Mountain road, thence by the direct road to the point where it meets the townland boundary between Kilkeel and Aughnaloopy townlands, thence by the townland boundary *via* Pookey bridge

to the Kilkeel river, thence by the Kilkeel river to the Newcastle road bridge at Riverside, thence by the direct road to Mullagh bridge, thence by the Mullagh river to Brackenagh bridge, thence by the direct road to Ballyveagh Beg main road, thence by Ballyveagh Beg main road to Brackenagh cross road, thence by the direct road over ford and townland boundary to Ballyveagh cross roads (near Ballyveagh school), thence by Longstone road, passing Moneydorragh school, to Mr. M'Kibbin's house, thence by Moneydorragh Beg road (known also as Rocky Hill road), passing Mr. Stewart's shop, to Newcastle road, thence by the direct road to Moneydorragh Beg Shore road, thence by Moneydorragh Beg Shore road to the point where it reaches the seashore, thence directly by the seashore to the point on the coast near Mr. O'Hagan's farm where the boundary between Ballynahatten and Cranfield townlands, in the Barony of Mourne, begins.

2. A District comprising—

Such parts of the Administrative County of Down as lie within the following boundary (the roads mentioned as forming the boundary being regarded as outside the prohibited area):—

Commencing at the point on the coast in the townland of Benagh Upper, in the Barony of Mourne, where the White Water river enters Millbay, thence by the White Water river to White Water bridge, thence by the direct road (which crosses the road leading from Grange School to Greencastle Post Office), passing Mr. Gordon's farm, to the seashore at Cranfield Bay, thence by the seashore *via* Greencastle Point to the point on the coast in the townland of Benagh Upper, in the Barony of Mourne, where the White Water river enters Millbay.

THIRD SCHEDULE.

ORDERS REVOKED.

The Black Scab in Potatoes (Special Area, Ireland) Order, 1913.
The Black Scab in Potatoes (Special Area, Ireland) Order, 1914.

No. A. 25596-14.

Department of Agriculture and
Technical Instruction for Ireland,
Upper Merrion Street, Dublin,
9th December, 1914.

DESTRUCTIVE INSECTS AND PESTS ACTS, 1877 and 1907.

Sir,

Adverting to the Department's letter (No. A. 11746-14) of the 10th August last, I have to acquaint you, for the information of your Council, that the Department's advice has been sought as to the procedure which County Councils should adopt in the event of their consenting to grant compensation for gooseberry bushes destroyed in compliance with Notices served under the American

Gooseberry Mildew and Black Currant Mite (Ireland) Order, 1912. I have accordingly to forward for the consideration of your Council the accompanying memorandum on the subject. So far as the memorandum relates to matters of administration, however, it should be clearly understood that it is for the County Council to decide on their own discretion whether or not they will adopt the suggestions submitted.

Some County Councils, who have been considering the matter of compensation and who desired to ascertain approximately the probable charge on the rates, have asked the Department to verify the numbers of bushes stated by claimants to have been destroyed. The Department will be prepared to do so as far as possible, but they cannot undertake that their officers will be in a position to apply any check to claims made in respect of bushes destroyed prior to 1st September, 1913, or to advise as to the quality of bushes destroyed before that date.

I am, Sir,
Your obedient Servant,
T. P. GILL,
Secretary.

The Secretary,
County Council.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

MEMORANDUM

Of Procedure suggested for Adoption by County Councils who consent to the Granting of Compensation for Gooseberry Bushes Destroyed under the Destructive Insects and Pests Acts, 1877 and 1907.

(1). Before fixing the scale of compensation for any particular year the County Council should have before them all the claims to be paid in that year. (This will enable the County Council to fix the total cost for the year). At the same time the County Council should consider whether the delay involved in payment of compensation would inflict any undue hardship on claimants. In this connection the Department are advised that subject to Section 3 (5) of the Act of 1877, no discrimination is permissible as to the class of person to whom compensation should be granted, e.g., it is not lawful to grant compensation to claimants who derive their livelihood in part or whole from fruit-growing, or the valuations of whose holdings do not exceed a limit to be fixed by the County Council and at the same time to refuse it in the case of other persons whose bushes were destroyed.

(2) The County Council should thereupon fix a scale for that year as follows :—

	Per Bush.
(*a*) For the best cultivated and most profitable bushes,	
(*b*) For less well-cultivated or less profitable bushes,..	
(*c*) For inferior bushes, but of some value, ...	

(The Inspector on whose report the notice was issued requiring the destruction of the bushes will be able to advise the County Council as to the quality of the bushes. As regards the rate per bush, the County Council may fix any sum not exceeding one-half the value of the bush if diseased, or three-fourths if healthy. In fixing the rate the value of the bushes to the owner should be taken into account, and for this purpose in the case of fruit growers regard may be had to the income which they would have continued to derive from the bushes if the latter were healthy and had not been destroyed.)

(3) The County Council should decide whether compensation should be granted in money or in supplying claimants with other plants. (It should be borne in mind, of course, that it is not advisable in view of the risk of the infection remaining in the ground to replant it with gooseberry bushes).

(4) The County Council should adopt a resolution in the form set forth in the attached draft marked "A." (A sealed copy of this resolution should be forwarded to the Department, who on receipt of same will make an Order authorising payment of compensation.)

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

"A."

Draft Copy of Resolution to be Adopted by a County Council Desiring to Grant Compensation.

The County Council of County hereby consent to the Department of Agriculture and Technical Instruction for Ireland making an Order authorising the payment of compensation by the County Council for gooseberry bushes destroyed in compliance with Notices served under the American Gooseberry Mildew and Black Currant Mite (Ireland) Order, 1912, to such amount or amounts (not exceeding the maximum limits prescribed in Section 3 of the Destructive Insects Act, 1877), as the County Council may think fit, and in such cases only and subject to such conditions as the County Council may prescribe.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

COMPENSATION FOR GOOSEBERRY BUSHES (CO. LOUTH) ORDER, 1914.

The Department of Agriculture and Technical Instruction for Ireland by virtue and in exercise of the powers conferred upon them by the Destructive Insects and Pests Acts, 1877 and 1907, and with

the consent of the County Council of Louth do order and it is hereby ordered as follows :—

(1) The County Council of the County of Louth are hereby authorised to pay out of the local rate compensation, as prescribed by the Destructive Insects Act, 1877, Section 3, for gooseberry bushes destroyed in County Louth in compliance with Notices served under the American Gooseberry Mildew and Black Currant Mite (Ireland) Order, 1912.

TITLE.

(2) This Order may be cited as The Compensation for Gooseberry Bushes (County Louth) Order, 1914.

In witness whereof, the Department of Agriculture and Technical Instruction for Ireland have hereunto affixed their Seal this 12th day of December, 1914.

(L S.) (Signed) H. G. SMITH,
on behalf of Secretary.

IMPORTANT TO SEED MERCHANTS AND FARMERS.

Under the Weeds and Agricultural Seeds (Ireland) Act, 1909, seed merchants are liable to exposure if they sell inferior seeds.

Seed merchants as well as farmers should protect themselves by purchasing only seeds which have been tested and found satisfactory as to purity and germination.

Read Leaflet No. 59, and get a copy of the Act.

The leaflet may be obtained free from the Department; the Act may be purchased, either directly or through any bookseller (price 1*d.*; post free, 1½*d.*), from Messrs. E. Ponsonby, Ltd., 116 Grafton Street, Dublin.

II.—AGRICULTURE.

A. B. MEMO. No 4.

Farmers are advised to consult their County Agricultural Instructor before buying any manure if they are in doubt as to its value; and, as far as possible, to use the manures recommended by the Department for the various crops.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND.

AGRICULTURAL BRANCH.

VALUATION OF ARTIFICIAL MANURES, 1915.

The following unit prices have been fixed by the Department for use *in comparing* the approximate commercial values of manures this season:—

Nitrogen	14/-	per unit.
Phosphates, soluble in water	1/11	,,
*Phosphates, soluble in citric acid ..	1/4	,,
†Bone phosphate	1/6	,,
Potash	6/9	,,

Owing to the war there is extreme difficulty in fixing unit prices which may fairly be expected to obtain throughout the season. In the event of any interference with supplies the prices may have to be changed, in which case the Department will revise the above figures.

The prospects of obtaining supplies of potash manure are extremely bad. It is likely, however, that in the early part of the season, at any rate, it can be purchased at 6/9 per unit as fixed above.

As potash is now so scarce and dear the Department do not recommend farmers to apply it to oats, barley, wheat, meadow hay, turnips, or mangels. The Department, accordingly, advise farmers to use for these crops the mixtures set out below. They are practically identical with those recommended in Leaflet No. 17, with the exception that potash is omitted save for the potato crop. Whatever potash can be purchased should be applied to the potato crop, which more than any other will pay for an application of this manure. For the turnip crop the Department recommend farmers to distribute their farmyard manure over as much of the ground as possible and to supplement this with superphosphate or basic slag instead of using dung more liberally on one portion of the ground and using only artificial manures on the remainder.

* The unit value of citric soluble phosphate in basic slag may be taken as 1s. 9d.
† In the case of compound manures no allowance should be made for insoluble phosphates unless from bone.

MANURES FOR VARIOUS CROPS.

1915 Season.

The following kinds and quantities of manure are recommended per statute acre :—

Oats or Barley.

A mixture of :—

1 cwt. sulphate of ammonia.
3 cwt. superphosphate.

Wheat.

1 cwt. nitrate of soda applied in March or April.

Meadow Hay.

A mixture of—

1 cwt. nitrate of soda,
3 cwt. superphosphate.

The superphosphate should be applied in February and the nitrate of soda early in April, or, if mixed together, these manures should be applied immediately after mixing.

Potatoes.

1 cwt. sulphate of ammonia,
4 cwt. superphosphate,

and as much potash as can be procured up to 1 cwt. muriate or sulphate of potash, or 4 cwt. kaïnit.

Turnips.

(*a*) For land in good condition :—

10-15 tons dung,
4-6 cwt. superphosphate or basic slag.

(*b*) For land naturally poor or in low condition :—

10-15 tons dung and a mixture of artificials, consisting of—

1 cwt. sulphate of ammonia,
4 cwt. superphosphate.

Mangels.

A dressing of 20 tons dung and a mixture of artificials consisting of—

2 cwt. sulphate of ammonia,
4 cwt. superphosphate,
4 cwt. salt.

These units are based on the present retail cash prices of manures of the highest class in Dublin and Belfast. When these units are multiplied by the respective percentages, in the analysis of a manure, and 10/- is added for mixing, the result will represent very nearly the *cash price* of one ton of the manure free of rail at Dublin or Belfast. To ascertain the corresponding price at any other place in Ireland, add the amount shown in the statement appended.

No one need pay more than these prices, and, in some instances, manures can be bought at something less; especially is this the case where farmers combine to bulk their orders, or where they buy the ingredients and mix for themselves.

The Department desire to point out that the above prices should not be applied to low grade manures, which may be composed of waste organic substances and of phosphates in a form not readily available by plants. Such compounds are often of little, if any, agricultural value, and can be produced at a low cost compared with manures compounded from first-class materials like sulphate of ammonia, superphosphate, and the well-known potash salts of proved merit.

The figures in the following table are believed to be substantially accurate, but *the Department accept no responsibility* for any inaccuracies due to alterations in railway or canal rates or other causes.

Statement showing the amount * which must be added to the Price of Manures in Dublin or Belfast to represent the cost of the same Manures at the following places when purchased from a local merchant or in quantity direct from the manufacturers :—

A.	Per Ton.		Per Ton.	B.	Per Ton.
Abbeydorney	8/9	Ardsollus	10/3	Bagnalstown	7/9
Abbeyfeale	11/-	Arigna	11/3	Balbriggan	4/-
Abbeyleix	7/9	Arklow	5/-	Balla	10/-
Achill	10/3	Armagh	5/6	Ballaghadereen	10/9
Adare	9/-	Armoy	6/3	Ballina	6/3
Adoon	10/9	Arva Road	8/9	Ballynahinch (Co. Galway).	11/-
Aghada	3/9	Askeaton	8/9		
Aghadowey	5/3	Athboy	5/6	Ballinamallard	8/9
Aghalee	3/9	Athenry	7/6	Ballinamore	11/3
Aldergrove	4/6	Athlone	6/3	Ballinamore (Donegal).	8/9
Annaghmore	5/3	Athy	5/6		
Antrim	3/9	Attanagh	7/9	Ballinascarty	6/3
Ardagh	9/9	Attymon	8/9	Ballinasloe	7/3
Ardara Road	11/-	Augher	8/3	Ballinass	7/6
Ardee	4/6	Aughnacloy	7/9	Ballincollig	3/8
Ardfert	8/3	Aughrim (Wicklow)	4/9	Ballinderry	3/6
Ardglass	5/-	Aun scaul	10/6	Ballindine	11/3
Ardrahan	9/9	Aylwardstown	3/6	Ballindrait	3/-

*These amounts, which in the majority of cases are not the actual rates of carriage per ton from Dublin or Belfast, are arrived at by ascertaining the difference between the cost price of one ton of manure free on rail from Dublin or Belfast and the cost of a ton of manure of the same quality imported at the nearest or cheapest port and adding to that difference the cost of conveyance per ton from that port to the buyer's station.

	Per Ton.
Ballineen	6/3
Ballinglen	5/9
Ballingrane	9/3
Ballinhassig	3/3
Ballinlough	10/6
Ballinrobe	11/-
Ballintogher	9/3
Ballintra	8/9
Ballybay	7/3
Ballybeg	5/6
Ballybofey (Stranorlar).	6/3
Ballyboley	6/-
Ballybrophy	6/3
Ballybunion	11/3
Ballycar	9/9
Ballycarry	4/-
Ballycastle (Antrim)	6/3
Ballyclare	2/6
Ballyclare Junc.	3/-
Ballyconnell	9/9
Ballycullane	4/6
Ballycumber	7/3
Ballydehob	8/9
Ballyduff (Cork)	6/6
Ballygawley	8/-
Ballyglunin	9/-
Ballygowan	2/3
Ballyhack	3/9
Ballyhaise	8/9
Ballyhale	4/9
Ballyhaunis	10/9
Ballyhooley	6/3
Ballyliffin	6/-
Ballymagan	4/9
Ballymagorry	4/-
Ballymartle	4/3
Ballymena	5/3
Ballymoe	10/-
Ballymoney	4/6
Ballymote	9/-
Ballynahinch (Co. Down).	4/-
Ballynahinch Junc. (Co. Down).	3/3
Ballynashee	6/6
Ballynoe	5/3
Ballynure	6/-
Ballyragget	7/6
Ballyroney	5/6
Ballyshannon	8/9
Ballysodare	7/9
Ballyvary	9/3
Ballyward	5/3
Ballywillan	8/6
Ballywilliam	5/-
Baltimore	8/9
Baltinglass	6/-
Banagher	7/3
Banbridge	4/6
Bandon	5/-
Bangor (Down)	2/-
Bansha	8/-
Banteer	6/6
Bantry	7/6
Barnagh	10/6
Batterstown	3/6
Bawnboy	11/3
Beauparc	4/3

	Per Ton.
Bective	5/-
Belcoo	12/6
Bellarena	5/-
Belleek	10/3
Bellurgan	5/3
Belmont	6/-
Belmullet	10/-
Belturbet	9/-
Bennett's Bridge	5/9
Beragh	7/6
Bessbrook	4/9
Birdhill	9/6
Blackrock (Cork)	3/3
Blackwatertown	5/6
Blarney	3/-
Blessington	3/3
Boher	8/9
Borris	7/-
Boyle	10/-
Bray	2/6
Bridge End	3/3
Bridgetown (Wexford)	5/6
Brittas	2/9
Brookeboro'	9/3
Brookmount	3/-
Bruckless	9/6
Bruree	7/6
Bunbeg	7/6
Buncrana	4/3
Bundoran	10/3
Bundoran Junc.	8/6
Burnfoot	3/6
Burton Port	6/9
Bush	5/3
Buttevant	6/-
C.	
Cahir	7/-
Cahirciveen	10/-
Caledon and Tynan	5/9
Camolin	5/-
Campile	3/6
Capecastle	6/9
Cappagh	6/9
Cappoquin	7/3
Caragh Lake	11/-
Carberry	5/6
Cargan	9/6
Carlingford	5/-
Carlow	6/9
Carndonagh	6/3
Carrickfergus	2/3
Carrichue	4/-
Carrickmacross	5/9
Carrickmore	7/6
Carrick-on-Shannon	8/6
Carrick-on-Suir	4/6
Carrigaline	3/9
Carrigaloe	4/-
Carrigans	4/-
Carrigrohane	3/-
Carrigtwohill	3/9
Carroll's Cross	4/3
Carrowen	4/-
Carrowmore	9/9
Cashel	9/6
Cashelnagore	6/9
Castlebar	8/9
Castlebellingham	5/-
Castleblayney	6/3

	Per Ton.
Castlecaldwell	10/-
Castleconnell	9/-
Castledawson	6/6
Castlederg	7/3
Castlefinn	5/3
Castlegregory	9/9
Castlegregory Junc.	9/-
Castlegrove	10/6
Castleisland	9/3
Castlemaine	10/-
Castlerea	10/3
Castlerock	4/9
Castletown	7/-
Castletownberehaven	8/9
Castletownroche	6/-
Castlewellan	5/3
Cavan	9/-
Celbridge	2/9
Chapel	5/9
Charlemont	5/3
Charlestown	11/-
Charleville	6/9
Church Cross	9/9
Church Hill	6/-
Clady	5/-
Clara	7/3
Clare Castle	8/9
Claremorris	10/9
Clashganny	6/-
Clifden	11/3
Cloghan	7/9
Clogher	8/6
Cloghroe	3/3
Clonakilty	6/3
Clonakilty Junc.	5/6
Clondulane	6/-
Clones	7/6
Clonmany	5/-
Clonmel	4/9
Clonsilla	1/9
Cloughjordan	8/-
Coachford	4/3
Coachford Junc.	3/3
Coagh (via Moneymore).	7/6
Coalisland	4/9
Colbinstown	5/6
Colebrook	9/3
Coleraine	2/6
Collooney	7/-
Comber	2/-
Convoy	5/9
Cookstown	7/6
Cookstown Junc.	4/9
Cootehill	8/-
Corbally	3/9
Corbet	5/-
Cork	1/3
Corofin	10/6
Courtmacsherry	5/-
Courtwood	5/3
Craigavad	2/-
Cratloe	9/-
Craughwell	9/-
Creeslough	6/9
Crew	6/9
Creighanroe	7/-
Crolly	6/9
Crookstown Road	4/3
Croom	8/-

	Per Ton.
Crossdoney	8/9
Crossgar	4/–
Crosshaven	4/6
Crossroads	9/-
Crumlin	4/–
Crusheen	11/3
Cullion	3/–
Culloville	5/6
Cullybackey	6/–
Culmore	1/3
Curry	10/9
D.	
Dalkey	3/–
Derryork	5/9
Dervock	5/9
Desert	6/–
Desertmartin	7/–
Devon Road	11/-
Dingle	8/9
Doagh	2/6
Donabate	3/3
Donaghadee	2/9
Donaghmore	6/6
Donamon	9/9
Donegal	7/9
Donemana	3/–
Donoughmore	4/3
Doonbeg	12/9
Dooniskey	4/9
Dooran Road	10/2
Downhill	5/–
Downpatrick	4/3
Draperstown	7/6
Drimoleague	7/9
Dripsey	3/9
Drogheda	1/3
Dromahair	9/–
Dromineer	7/3
Dromkeen	9/3
Dromod	8/6
Dromore (Down)	3/9
Dromore Road	8/–
Drumfries	5/3
Drumree	3/9
Drumshambo	11/3
Drumsna	9/6
Drumsurn	5/6
Duleek	3/9
Dunadry	4/–
Dunboyne	2/6
Duncannon	3/9
Duncormick	5/9
Dundalk or D'dalk Junc.	2/6
Dundrum (Down)	5/–
Dundrum (Dublin)	2/–
Dundrum (Tipp.)	9/–
Dunfanaghy	7/6
Dunfanaghy Road	6/9
Dungannon	6/–
Dungarvan	5/–
Dungiven	6/–
Dungloe Road	6/9
Dunkineely	9/6
Dunlavin	5/3
Dunleer	4/–
Dunloy	5/9
Dunmanway	7/–
Dunsandle	9/6
Durrow	5/6

	Per Ton.
Durrus Road	8/6
E.	
Edenderry	3/6
Edermine Ferry	4/6
Edgeworthstown	7/9
Eglinton	3/3
Embankment	1/–
Emly	8/3
Eymvale Road	7/3
Enfield	4/9
Ennis	8/9
Enniscorthy	2/6
Enniskillen	9/–
Ennistymon	13/–
F.	
Fahan	3/9
Falcarragh Road	6/9
Farranaleen	6/6
Farranfore	9/–
Farrangalway	4/6
Fenit	7/6
Ferbane	6/9
Fermoy	5/9
Ferns	3/9
Fethard	6/6
Fiddown	4/–
Fintona	7/3
Fintown	8/3
Firmount	4/–
Fivemiletown	9/–
Float	7/9
Florencecourt	11/–
Foxford	8/3
Foxhall	6/3
Fox's Bridge	3/9
Foynes	10/–
G.	
Galway	5/–
Garvagh	5/3
Geashill	7/–
Gibbstown	5/6
Glanworth	6/–
Glarryford	6/3
Glaslough	6/9
Glenavy	4/–
Glenbeigh	11/3
Glenealy	3/6
Glenfarne	11/9
Glengariffe	8/6
Glenmaquin	5/9
Glenmore	7/6
Glenties	8/9
Glin (Kerry)	11/3
Glynn	4/6
Goold's Cross	9/–
Goraghwood	4/6
Goresbridge	6/9
Gorey	4/9
Gormanstown	4/–
Gort	10/3
Gortatlea	8/9
Gowran	7/–
Graigue	5/6
Grange	3/9
Grange Con	5/9
Greencastle	1/9
Greenisland	2/6

	Per Ton
Greenore	5/–
Greystones	3/9
Groomsport	3/–
Gweedore	6/9
H.	
Hamilton's Bawn	6/3
Harristown	4/6
Haulbowline	4/–
Hazelhatch	2/9
Headford Junc.	8/6
Healy's Bridge	3/–
Helen's Bay	2/6
Hilden Siding	2/–
Hill of Down	5/6
Hillsborough	3/–
Hollyhill	10/–
Hollymount	11/6
Holywood	1/6
Horse and Jockey	7/3
Horseleap	7/3
Howth	2/9
I.	
Inch	5/3
Inch Road	3/6
Inniskeen	4/9
Inver	10/3
Irvinestown	8/9
J.	
Jordanstown	3/–
K.	
Kanturk	6/9
Katesbridge	5/3
Keady	6/6
Kells (Ballymena)	8/9
„ (Meath)	6/–
„ (Kerry)	13/–
Kellswater	5/3
Kenmare	7/3
Kesh	9/3
Kilbeggan	7/6
Kilcock	3/9
Kilcoe	10/3
Kilcool	3/3
Kilcrea	3/9
Kildare	5/–
Kildysart	11/3
Kilgarvan (Kerry)	9/6
Kilgarvan (Tipp.)	7/9
Kilkee	12/6
Kilkenny	6/–
Killagan	6/3
Killala	7/9
Killaloe	8/9
Killarney	9/–
Killeagh	5/3
Killeshandra	8/9
Killinick	4/9
Killorglin	10/–
Killough	5/–
Killucan	6/3
Kilumney	3/3
Killurin	4/9
Killybegs	8/9
Killygordon	6/–
Killylea	5/9
Kilmacow	3/3

	Per Ton.
Kilmacrennan	7/–
Kilmacthomas	4/6
Kilmainham Wood	6/6
Kilmallock	7/6
Kilmeaden	3/9
Kilmessan	4/6
Kilmorna	10/9
Kilmurry (Cork) ..	4/–
„ (Clare) ..	13/6
Kilrane	3/9
Kilrea	5/9
Kilroot	3/3
Kilrush	10/–
Kilsheelan	5/6
Kiltimagh	11/9
Kingscourt	6/9
Kinsale	5/–
Kinsale Junc. ..	4/–
Knockanally ..	7/–
Knockcroghery ..	9/3
Knocklong	8/–
Knockloughrim ..	7/–
Kylemore	8/–
L.	
Laffan's Bridge ..	7/–
Laghey	8/9
Lahinch	13/3
Lanesborough ..	8/–
Larne	4/6
Larne Harbour ..	4/9
Laurencetown ..	4/9
Laytown	3/9
Leighlinbridge ..	7/9
Leitrim	5/6
Leixlip	2/9
Letterkenny ..	5/9
Levittstown ..	6/–
Leyny	9/3
Limavady	4/9
„ Junc. ..	4/3
Limerick	6/3
„ Junc. ..	7/6
Lisbellaw	9/3
Lisburn	2/–
Liscooley	5/9
Lisduff	8/9
Liselton	13/3
Lismore	7/3
Lisnagry	8/9
Lisnaskea	9/–
Lispole	10/9
Listowel	10/3
Lixnaw	9/6
Lombardstown ..	6/–
Londonderry ..	1/3
Longford	8/3
Loo Bridge	9/–
Loughgilly	5/3
Loughrea	9/9
Lowtown	4/3
Lucan	2/6
Lurgan	3/9
Lusk	3/3
Luska	7/3
Maam Cross ..	9/9
Macfin Junc. ..	4/9
Macmine Junc. ..	5/3

	Per Ton.
Macroom	5/3
Madore	8/3
Mageney	6/–
Maghera	7/6
Magherafelt ..	6/9
Magheramorne ..	4/6
Magilligan	5/6
Maguiresbridge ..	9/–
Malahide	2/3
Malin Head ..	5/–
Mallaranny ..	9/9
Mallow	5/6
Manorcunningham	5/–
Manorhamilton ..	10/9
Markethill	5/6
Maryboro'	6/3
Maynooth	3/–
Middleton	3/6
Middletown (Armagh)	6/3
Milford (Carlow) ..	6/9
„ (Donegal) ..	7/6
Millstreet	7/3
Milltown (Tuam) ..	10/9
Milltown-Malbay ..	13/9
Mitchelstown ..	6/9
Moate	7/9
Mogeely	4/6
Mohill	10/9
Moira	3/3
Molahiffe	9/6
Monaghan	6/3
Monaghan Road ..	7/6
Monasterevan ..	4/9
Moneymore ..	7/3
Monkstown (Cork) ..	4/–
Moorfields	8/3
Morley's Bridge ..	9/3
Mountain Stage ..	12/6
Mountcharles ..	8/6
Mountmellick ..	5/9
Mountpleasant ..	6/–
Mountrath	7/9
Mountshannon ..	9/9
Mourne Abbey ..	4/9
Moville	3/9
Moy	5/3
Moycullen	6/9
Muckamore ..	4/6
Mullafarnaghan ..	4/3
Mullinavat	3/9
Mullingar	6/6
Mulroy	7/6
Multyfarnham ..	7/–
N.	
Naas	3/6
Navan	4/6
Nenagh	7/3
Newbliss	8/–
Newbridge	4/3
Newbuildings ..	3/3
Newcastle (Down) ..	5/–
Newcastle West ..	10/–
Newcastle (Wicklow)	3/3
Newmarket (Cork)	7/3
Newport (Mayo) ..	8/–
Newport Trench ..	4/3
New Ross	2/6
Newry	2/6
Newtownards ..	2/–

	Per Ton
Newtownbutler ..	8/6
Newtowncunningham	4/–
Newtownforbes ..	8/6
Newtownstewart ..	6/–
Nobber	6/3
O.	
O'Brien's Bridge ..	9/9
Oldcastle	7/3
Omagh	6/9
Omeath	5/9
Oola	9/–
Oranmore	6/6
Oughterard ..	8/–
Ovoca	4/3
P.	
Palace East ..	4/9
Pallas	9/3
Parkmore	8/3
Parsonstown ..	7/3
Passage West ..	3/9
Patrick's Well ..	8/6
Peake	4/–
Pettigo	9/9
Philipstown ..	5/9
Pluck	5/6
Pomeroy	7/–
Portadown	3/9
Portarlington ..	5/–
Portglenone ..	5/9
Porthall	4/–
Portrush	2/6
Portsalon	7/6
Portstewart ..	4/3
Portumna	8/3
Poulaphouca ..	3/9
Poyntzpass ..	5/3
Q.	
Queenstown ..	4/3
Queenstown Junc. ..	3/6
Quilty	13/9
Quin	10/3
R.	
Raffeen	3/9
Rahan	6/3
Ramelton	6/3
Randalstown ..	5/–
Raphoe	5/3
Rathangan	5/3
Rathdrum	3/3
Rathduff	4/–
Rathfriland ..	9/–
Rathkeale	9/6
Rathmore	8/–
Rathmullen ..	6/3
Rathnew	3/3
Rathvilly	6/3
Recess	10/6
Redhills	8/9
Retreat	10/–
Rhoda Bridge ..	4/–
Richhill	5/3
Ringaskiddy ..	4/–
Robertstown ..	4/3
Rochestown ..	3/3
Rockcorry	7/6
Rooskey	7/–

	Per Ton.
Roscommon	9/9
Roscrea	8/6
Ross	7/9
Rosslare	5/-
Rossmore	8/3
Rossnowlagh	10/3
Rush and Lusk	3/3
Rushbrook	4/-
S.	
St. Anne's	3/-
Saintfield	2/9
St. Johnston	3/6
St. Mullins	5/6
Sallins	3/6
Sallybrook	5/-
Scariff	9/6
Scarva	5/6
Schull	8/9
Shankill	2/6
Shannon Bridge	8/-
" Harbour	6/6
Shillelagh	6/3
Sion Mills	5/-
Sixmilebridge	9/6
Sixmilecross	7/9
Skerries	3/9
Skibbereen	8/3
Sligo	6/3
Smithborough	7/6
Sneam	8/3
Spa	8/6
Sparrowsland Sdg.	5/9
Staffordstown	5/9
Stewartstown	6/6
Strabane	3/6
Straffan	3/3
Stranocum	6/-
Stranorlar	6/3
Streamstown	7/6
Swinford	11/6
T.	
Tallaght	-/9
Tallow Road	6/9
Tanderagee	4/9
Tarbert	11/3
Templemore	6/3
Templepatrick	3/9
The Lamb	2/9
Thomastown	5/6
Thurles	6/9
Timoleague	5/9
Tinahely	5/9
Tipperary	8/3
Toomebridge	6/-
Tower Bridge	2/9
Tralee	6/3
Tramore	2/9
Trew and Moy	5/9
Trillick	8/3
Trim	5/-
Tuam	9/6
Tubber	10/9
Tubbercurry	9/9
Tullamore	5/6
Tullow	7/-
Tullymurry	5/-
Tynan	5/9
U.	
Upperlands	7/3
Upton	4/3
V.	
Valentia Harbour	10/-
Vernersbridge	5/6
Vicarstown	6/-
Victoria Bridge	5/3
Virginia Road	6/9
W.	
Warrenpoint	4/6
Waterfall	3/3
Waterford	1/3
Wellington Bridge	5/3
Westport	6/3
Westport Quay	6/3
Wexford	2/6
Whiteabbey	2/-
Whitehead	3/9
Wicklow	1/3
Wilkinstown	5/9
Woodenbridge	5/-
Woodlawn	9/6
Y.	
Youghal	5/-

The following are examples showing how manures may be valued by means of the unit prices given in this memorandum:—

1. Suppose a manure for potatoes is guaranteed to contain "3 per cent. nitrogen, 16 per cent. soluble phosphates, and 2 per cent. potash," its value at Manorhamilton would be reckoned thus:—

			£	s.	d.
Nitrogen	3 per cent.	@ 14/- per unit	= 2	2	0
Soluble phosphates	16 "	@ 1/11 "	= 1	10	8
Potash	2 "	@ 6/9 "	= 0	13	6
Allowance for mixing			= 0	10	0
Special Allowance for Manorhamilton (see statement appended)			= 0	12	0
Value per ton at Manorhamilton			= 5	8	2

2. Suppose the guaranteed analysis is "14 per cent. soluble phosphates and 4 per cent. nitrogen," the value of the manure at Tuam would be reckoned thus:—

			£	s.	d.
Soluble phosphates	14 per cent.	@1/11 per unit	= 1	6	10
Nitrogen	4 "	@ 14/- "	= 2	16	0
Allowance for mixing			= 0	10	0
Special Allowance for Tuam (see statement appended)			= 0	9	6
Value per ton at Tuam			= £5	2	4

Read Leaflet No. 17.—The Use and Purchase of Manures.

LEAFLET NO. 17.
(SPECIAL SUPPLEMENT.)

Department of Agriculture and Technical Instruction for Ireland.

ARTIFICIAL MANURES FOR 1915 CROPS.

Owing to the War, potash is now so scarce and dear that it will not pay farmers to apply it to oats, barley, wheat, meadow hay, turnips, or mangels. They are accordingly strongly advised to use for these crops the mixtures set out below.

Whatever potash can be purchased should be applied to the potato crop which more than any other will pay for an application of this manure. Farmers should, therefore, use per statute acre for potatoes in addition to dung

1 cwt. sulphate of ammonia,
4 cwt. superphosphate,

and as much potash as they can procure, up to 1 cwt. muriate or sulphate of potash, or 4 cwt. kainit.

For the turnip crop the Department recommend farmers to distribute their farmyard manure over as much of the ground as possible and to supplement this with superphosphate or basic slag instead of using dung more liberally on one portion of the ground and using only artificial manures on the remainder.

For information as to how to value manures see A.B. Memo. No. 4.

December, 1914.

MANURES FOR VARIOUS CROPS.
1915 Season.

The following kinds and quantities of manure are recommended per statute acre:—

OATS OR BARLEY.

A mixture of:—

1 cwt. sulphate of ammonia,
3 cwt. superphosphate.

WHEAT.

1 cwt. nitrate of soda applied in March or April.

MEADOW HAY.

A mixture of :—

1 cwt. nitrate of soda,
8 cwt. superphosphate,

The superphosphate should be applied in February and the nitrate of soda early in April, or, if mixed together, these manures should be applied immediately after mixing.

POTATOES.

1 cwt. sulphate of ammonia,
4 cwt. superphosphate,
and as much potash as can be procured, up to 1 cwt. muriate or sulphate of potash, or 4 cwt. kainit.

TURNIPS.

(*a*) For land in good condition :—
10-15 tons dung,
4-6 cwt. superphosphate or basic slag.

(*b*) For land naturally poor or in low condition :—
10-15 tons dung and a mixture of artificials, consisting of :—
1 cwt. sulphate of ammonia,
4 cwt. superphosphate.

MANGELS.

A dressing of 20 tons dung and a mixture of artificials consisting of :—
2 cwt. sulphate of ammonia,
4 cwt. superphosphate,
4 cwt. salt.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

FARMING AND THE FOOD SUPPLY.

On the outbreak of war the Department issued a notice to farmers, warning them of the danger of selling breeding animals and of disposing of grain which would be required for seed. They pointed out, at the same time, the advantage of sowing catch crops for the production of spring feeding for cattle and the necessity of taking immediate steps to grow a larger area of wheat and to increase generally the area under tillage. The importance of these measures was emphasised at a meeting of the Council of Agriculture. A resolution of that body urging the special importance of these and other matters was widely circulated, and County Committees of Agriculture and the Agricultural Instructors were advised to devote particular

attention to giving effect to this policy. Reports received by the Department show that farmers are responding to this appeal.

In every county the Committee of Agriculture and the Agricultural Instructors have worked energetically to ensure a large increase in the area devoted to catch crops. The success of their efforts has already been noted in the Press.

Further reports are now to hand with regard to the sowing of wheat, and it is gratifying to find that in this respect also a very large number of farmers have acted upon the advice given them and that the area under wheat next year will be substantially increased. In every county there appears to have been an increase in the sowing of this crop, while in some the area usually sown has been multiplied several times.

As the sowing of winter wheat is now nearing completion, the Department desire to direct attention to the fact that much of the land sown with this crop would, in ordinary circumstances, have been sown with oats. Accordingly, if the area under the latter crop is to be increased, or even maintained, it will be necessary that farmers should immediately take in hands the ploughing up of grass lands to provide an adequate area for oats.

While in most cases the land to be broken up has been under grass for a short period only, a largely increased area of oats can be obtained only by utilising older grass lands. For this purpose the Department do not suggest that the best grazing land should be taken. There is a very large area of sound second-class grass land quite suitable for tillage, and this should now be ploughed up as early as possible.

There is some danger of attacks by insect pests when oats are sown on old grass land. It is accordingly desirable that the seed selected for sowing such land should be a variety that tillers freely, such, for example, as "Potato," or "Black Tartary." The application of the mixture of artificial manures specified below will greatly reduce the injury arising from insect pests, and when the land is so manured or is in good condition the newer varieties of oats, such as "Abundance," "Banner," or "Waverley," are recommended except for the North of Ireland, where farmers may safely rely upon the varieties "Potato," "Island Magee," and "Sandy."

In the majority of cases it will pay farmers to apply the following mixture of artificial manures to oats sown after grass, viz. :—

3 cwt.	Superphosphate	per statute acre.
1 ,,	Sulphate of Ammonia	

Information received by the Department shows that, as indicated in their original leaflet, seed is likely to be dear. Farmers, therefore, should have samples of their own oats tested at the Department's Seed Testing Station, and such as are suitable should be retained for seed. Those who will

have to purchase seed are advised to do so as soon as possible. At present prices it will pay farmers who have oats suitable for seed to retain them for that purpose, replacing them by purchased feeding stuffs, such as bran, maize, dried grains and cakes, amongst which cocoa-nut and palm-nut cakes can be recommended.

From reports by their Inspectors at fairs and ports the Department observe, with grave concern, that young heifers and stripper cows are being sold for slaughter or exportation in considerable numbers. They desire, therefore, to call attention to the fact that, if the tendency of stock-owners to get rid of such animals continues unchecked, the stock of breeding animals in the country is in danger of serious depletion. No doubt, the possibility of a shortage in feeding stuffs accounts in some measure for abnormal sales of immature cattle at present, but there can be no good reason for the slaughter or exportation of young heifers, while the export of this class of stock in large numbers must have a lowering effect upon the market. On the other hand, the farmer who, at the present juncture, retains his breeding animals and exercises due foresight and economy in the use of feeding stuffs may confidently count on profit later on, when supplies are scarce and prices, consequently, high. Apart, however, from this consideration, which should have weight with stock-owners who may be tempted to dispose of female stock at once, there is the fact that the general interests of the country absolutely demand that the stock of breeding animals still available should be conserved. The Department, therefore, appeal to all persons concerned in the live stock industry to discourage by every means in their power the slaughter or exportation of such animals.

Attention is directed to the fact that during the coming season potassic manures will be so scarce and dear that farmers will be unable to get the complete mixtures of artificial manures recommended by the Department for the different crops. For oats, hay, turnips, and mangels the Department's formulæ, omitting potash, should be used; for the potato crop, which more than any other pays for the application of potash, the complete formula, even at the present enhanced price of potash, is recommended.

Irish farmers should realise that the liquid manure from cow houses, which is nearly always allowed to run to waste, contains not only nitrogen but potash. If, therefore, they would see that this manure is saved and applied to the land it would do much to make up for the shortage of potash from other sources. The results of numerous experiments made by the Department with liquid manure show that on the average liquid manure as collected in tanks and applied to the hay crop is, weight for weight, equivalent in fertilising value to ordinary solid manure.

December, 1914.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

SCHEME OF AGRICULTURAL EXPERIMENTS.

[*The original Scheme of manurial and variety experiments was first put into operation in* 1902. *The object of the manurial experiments was to ascertain the most suitable combinations of manures for each of the principal farm crops. These experiments were continued until* 1911. *The superiority of the results from certain mixtures was so uniform throughout the period during which the scheme had then been in operation that further repetition of the tests was not considered necessary after that year. In* 1908 *a second series of manurial experiments was introduced with a view to determining, in the case of the manures which had given the best results in previous years, what were the most advantageous proportions in which the several ingredients should be mixed. Details of this series of tests, including some additions made in* 1911 *and* 1914, *are given in Division A of the following Scheme. Slight changes in the variety experiments have been made from time to time, those varieties which had been sufficiently tested being omitted and new varieties being added when necessary.*

Experiments in the feeding of Live Stock were commenced in 1911. *The scheme then adopted was repeated during the* 1912-13 *season. An entirely new series as detailed in Division B of the Scheme was introduced for* 1913-14 *and will be continued for* 1914-15.]

Before commencing field experiments and demonstrations each year, each Agricultural Instructor must submit to the County Committee and the Department his plans for the work, showing the number and variety of the experiments and demonstrations which he proposes to conduct and the estimated cost in detail of the seeds, manures, and accessories required.

When his proposals have been approved by the County Committee and the Department, the Instructor should, on behalf of the Committee, order the seeds and manures in the requisite quantities. The Instructor must not, of course, obtain goods for which the Committee are liable for payment without authorisation from the Committee to do so. He should take every precaution to ensure that the seeds and manures are of the kinds specified in the scheme, and that the prices charged are not in excess of current market rates. The merchants' accounts are to be carefully examined by him, and he is required to certify as to their accuracy before they are presented to the County Committee for payment. Returns in connection with

the experiments of each class (manurial, variety, etc.) on the several crops dealt with should be furnished to the Department on the forms supplied for the purpose immediately after the necessary weighings, etc., have been completed on all the plots of any one class from which reliable results can be obtained. Particulars of all experiments of the same class should be furnished together on *one* appropriate form and the averages, etc., indicated on the form fully worked out.

The dates before which the reports dealing with experiments with the different crops must reach the Department are as follows :—

Meadow Hay	..	..	30th September.
Potatoes ..	..	..	15th November.
Mangels ..	..	..	30th November.
Turnips ..	..	..	15th December.
Grain ..	..	..	21st December.

The Department should be duly informed of the failure of any experiment.

The Instructor should submit to the County Committee, as soon as possible after the completion of his experimental work each season, a report on the results obtained during the season, so that if the Committee desire to publish the report, they may obtain the approval of the Department and have the report circulated among farmers prior to the commencement of the following season's field operations.

The experiments are intended as object-lessons to farmers in the cultivation, manuring, and seeding of land, and should be labelled so that an ordinary observer may be able easily to ascertain what they are intended to show. One label will suffice for each demonstration plot, but in the case of an experiment which includes several plots, a larger label stating the general character of the experiment should be erected in addition to the smaller labels, giving particulars with respect to each of the plots included in the experiment. The labels should be capable of resisting the weather.

No change must be made in any of the manurial experiments as given below, but the Instructor may include such additional plots as local conditions render advisable. In the variety tests, Instructors are required to include all the varieties specified in each list.

It should be noted that both seeds and manures must not be supplied for the same experiment or demonstration.

Demonstration plots should not exceed one-quarter acre in area.

Instructors with less than two years' experience of itinerant work must not undertake live stock experiments unless they obtain the Department's special approval for doing so.

A.—SCHEME OF THE FIELD EXPERIMENTS.

I.—Oat Crop (Variety Test).

Size of plots not less than one-eighth or more than a quarter of a statute acre.

The following varieties to be tested :—

1. Potato.
2. Black Tartarian.
3. Abundance.
4. Waverley.
5. Yielder.
6. Banner.
7. Any other varieties.

II.—Barley Crop (Variety Test).

Size of plots, not less than one-eighth or more than a quarter of a statute acre.

The following varieties to be tested :—

1. Archer.
2. Goldthorpe.
3. Any other varieties.

III.—Wheat Crop (Variety Test).

Size of plots, not less than one-eighth or more than a quarter of a statute acre.

The following varieties to be tested :—

1. Queen Wilhelmina.
2. White Stand Up.
3. Squarehead Master.
4. Any other varieties.

IV.—Turnip Crop (Manurial Test WITH Farmyard Manure).

Size of plots, one-twentieth of a statute acre.

The following kinds and quantities (per statute acre) of manures to be applied :—

No. of Plot.	
1	15 tons farmyard manure.
2	15 tons farmyard manure. 4 cwt. Superphosphate.
3	15 tons farmyard manure. 5 cwt. Superphosphate.
4	15 tons farmyard manure. 6 cwt. Superphosphate.
5	15 tons farmyard manure. 4 cwt. Basic Slag.
6	15 tons farmyard manure. 5 cwt. Basic Slag.
7	15 tons farmyard manure. 6 cwt. Basic Slag.

V.—**Turnip Crop** (Manurial Test WITHOUT Farmyard Manure).

Size of plots, one-twentieth of a statute acre.

The following kinds and quantities (per statute acre) of manures to be applied :—

No. of Plot.	
1	4 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 3 cwt. Kainit.
2	5 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 3 cwt. Kainit.
3	6 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 3 cwt. Kainit.
4	4 cwt. Basic Slag. 1 cwt. Sulphate of Ammonia. 3 cwt. Kainit.
5	5 cwt. Basic Slag. 1 cwt. Sulphate of Ammonia. 3 cwt. Kainit.
6	6 cwt. Basic Slag. 1 cwt. Sulphate of Ammonia. 3 cwt. Kainit.
7	6 cwt. of mixture of artificials applied to Plot 1.

VI.—**Turnip Crop** (Variety Test).

Size of plots, each four ridges full length of field.

The following varieties to be tested :—

SWEDES.

1. Improved Purple Top.
2. Best of All.
3. Magnum Bonum.
4. Triumph.
5. Shamrock.
6. Incomparable Green Top (Garton).
7. Any other varieties.

YELLOW TURNIPS.

8. Centenary.
9. Aberdeen Green Top.
10. Any other varieties.

VII.—Mangel Crop (Manurial Test).

Size of plots, one-twentieth of a statute acre.

The following kinds and quantities (per statute acre) of manures to be applied:—

No. of Plot	
1	20 tons farmyard manure.
2	20 tons farmyard manure. 3 cwt. Superphosphate. 2 cwt. Sulphate of Ammonia. 4 cwt. Salt.
3	20 tons farmyard manure. 4 cwt. Superphosphate. 2 cwt. Sulphate of Ammonia. 4 cwt. Salt.
4	20 tons farmyard manure. 5 cwt. Superphosphate. 2 cwt. Sulphate of Ammonia. 4 cwt. Salt.
5	20 tons farmyard manure. 4 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 4 cwt. Salt.
6	20 tons farmyard manure. 4 cwt. Superphosphate. 3 cwt. Sulphate of Ammonia. 4 cwt. Salt.
7	20 tons farmyard manure. 4 cwt. Superphosphate. 2 cwt. Sulphate of Ammonia. 2 cwt. Salt.
8	20 tons farmyard manure. 4 cwt. Superphosphate. 2 cwt. Sulphate of Ammonia. 6 cwt. Salt.
9	20 tons farmyard manure. 7½ cwt. of mixture of artificials applied to Plot 3.

VIII.—Mangel Crop (Variety Test).

Size of plots, each four ridges full length of field.

The following varieties to be tested:—

1. Yellow Globe.
2. Prize Winner.
3. Golden Tankard.
4. Long Red.
5. Any other varieties.

IX.—Potato Crop (Manurial Test).

Size of plots, one-twentieth of a statute acre.

The following kinds and quantities (per statute acre) of manures to be applied:—

No. of Plot.	
1	15 tons farmyard manure.
2	15 tons farmyard manure. 3 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 1 cwt. Muriate of Potash.
3	15 tons farmyard manure. 4 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 1 cwt. Muriate of Potash.
4	15 tons farmyard manure. 5 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 1 cwt. Muriate of Potash.
5	15 tons farmyard manure. 4 cwt. Superphosphate. 1½ cwt. Sulphate of Ammonia. 1 cwt. Muriate of Potash.
6	15 tons farmyard manure. 4 cwt. Superphosphate. 2 cwt. Sulphate of Ammonia. 1 cwt. Muriate of Potash.
7	15 tons farmyard manure. 4 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 1½ cwt. Muriate of Potash.
8	15 tons farmyard manure. 4 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 2 cwt. Muriate of Potash.
9	15 tons farmyard manure. 4½ cwts. of mixture of artificials applied to Plot 3.

X.—Potato Crop (Variety Test).

Size of plots, one-fortieth of a statute acre.

The following varieties to be tested:—

Maincrop.

1. Up-to-Date.
2. Arran Hope.
3. Summit.
4. Irish Queen.
5. Shamrock.
6. Old Champion.
7. Arran Chief.
8. Any other varieties.

Mid-Season.

9. British Queen.
10. Abundance.
11. Any other varieties.

XI.—Experiment with Potatoes to test the Effects of the Introduction of New Seed from different districts.

Seed for this experiment (except that used in Plot 1) will be supplied by the Department. The seed for all plots is to be of the Up-to-Date variety.

It is hoped to supply seed of uniform quality for plots 2 to 7, inclusive. The farmer's homegrown seed for Plot 1 should be of similar size as that supplied for the other plots, and it should be treated in the same way as regards sprouting. The seed for all plots is to be planted whole.

Size of plots, one-fortieth of a statute acre.

No. of Plot		No. of Plot	
1.	Farmer's homegrown seed.	5.	Seed grown in Connaught.
2.	Seed grown in Ulster.	6.	,, ,, England.
3.	,, ,, Munster.	7.	,, ,, Scotland.
4.	,, ,, Leinster.		

NOTE.—The produce of these plots need not be retained. The Department will supply fresh seed from the same sources each season for two or three years to enable Instructors to repeat the experiment—not necessarily on the same farms.

XII.—Experiment with Potatoes to test the Effects of Improved Methods of Cultivation.

This experiment is designed to show the combined effect resulting from the sprouting of the seed, the application of artificial manures and the spraying of the crop.

Seed of the same stock is to be planted in both plots in the experiment.

Size of plots, one-twentieth of a statute acre.

Plot 1. The seed for this plot is to be planted whole and to be taken directly from the pit at the time of planting, only 20 tons per statute acre of farmyard manure to be applied and the crop left unsprayed.

Plot 2. Similar seed as for Plot 1, but it must have been previously sprouted in boxes; 6 cwt. per statute acre of the mixture of artificial manures recommended by the Department for potatoes to be applied in addition to 20 tons of farmyard manure per statute acre, and the crop to be sprayed twice.

XIII.—Potato Crop (Boxing Test).

Size of plots, one-twentieth of a statute acre.

1. "Seed" boxed before December 1st.
2. Unsprouted seed.

(NOTE.—Not more than twelve sprouting boxes should be supplied for the purpose of an experiment or demonstration.)

XIV.—Potato Crop (Spraying Test).

Size of plots, one-tenth of a statute acre.

(120 gallons of mixture to be applied per statute acre at each spraying.)

The following to be compared :—

No. of Plot.

1. Unsprayed.
2. Effect of a 1 per cent. lime or Bordeaux mixture, double application.
3. Effect of a 2 per cent. lime or Bordeaux mixture, single application.
4. Effect of a 2 per cent. lime or Bordeaux mixture, double application.
5. Effect of a 1 per cent. soda or Burgundy mixture, double application.
6. Effect of a 2 per cent. soda or Burgundy mixture, single application.
7. Effect of a 2 per cent. soda or Burgundy mixture, double application.

XV.—Destruction of Charlock (Preshaugh) and other Weeds (Spraying Test).

Size of plots, one-tenth of a statute acre.

The following solutions will be tested :—

No. of Plot

1. Unsprayed.
2. 50 gallons 3 per cent. Sulphate of Copper.
3. 80 gallons 3 per cent. Sulphate of Copper.

XVI.—Improvement of Second Class Pasture.

Improvement to be estimated by Observation.

Size of plots, one-quarter of a statute acre.

The following kinds and quantities (per statute acre) of manures to be applied :—

No. of Plot.	
1	5 cwt. Basic Slag (high grade).
2	5 cwt. Basic Slag (high grade). 2 cwt. Kainit.
3	10 cwt. Basic Slag (high grade).
4	10 cwt. Basic Slag (high grade). 2 cwt. Kainit.
5	5 cwt. Potassic Superphosphate.
6	10 cwt. Potassic Superphosphate.

XVII.—Influence of Seed Mixtures in forming Pasture.

Land selected to be left in grass for not less than two years.

Size of plots, not less than one-tenth or more than one-fourth of a statute acre.

The following mixtures to be tested :—

Plot 1.

1 bushel Italian Rye Grass (22 lb. per bushel).
½ bushel Perennial Rye Grass (28 lb. per bushel).
4 lb. Red Clover.
2 lb. White Clover.

Plot 2.

1 bushel Perennial Rye Grass (28 lb. per bushel).
½ bushel Italian Rye Grass (22 lb. per bushel).
4 lb. Red Clover.
2 lb. White Clover.

Plot 3.

18 lb. Perennial Rye Grass.
9 lb. Italian Rye Grass.
3 lb. Timothy.
3 lb. Cocksfoot.
4 lb. Broad Red Clover.
2 lb. Alsike Clover.
1 lb. White Clover.

Plot 4.

15 lb. Perennial Rye Grass.
7 lb. Italian Rye Grass.
4 lb. Meadow Fescue.
3 lb. Timothy.
3 lb. Cocksfoot.
4 lb. Broad Red Clover.
2 lb. Alsike Clover.
2 lb. White Clover.

Plot 5.

At the discretion of the Instructors the following mixture (Elliot's) may be tested, but only on poor thin land :—

	Quantity of Seed per acre lb.
Cocksfoot	10
Meadow Fescue	5
Tall Fescue	4
Tall Oat-like Grass	3
Hard Fescue	1
Rough-stalked Meadow Grass	½

	Quantity of Seed per acre lb.
Smooth-stalked Meadow Grass	1
Golden Oat Grass	½
Italian Rye Grass	3
White Clover	2
Alsike Clover	1
Late-flowering Red Clover	2
Kidney Vetch	2½
Chicory	3
Burnet	8
Sheep's Parsley	1
Yarrow	½
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XVIII.—Liquid Manure Experiments.

(*a*) On First Crop Hay or Old Meadow, preferably the former

Size of plots, one-sixteenth of a statute acre (for small farms, each plot may be one-fortieth of a statute acre).

The following kinds and quantities (per statute acre) of manures to be applied:—

No. of Plot.

1. No manure.
2. 16 tons farmyard manure, applied before 15th February.
3. 16 tons liquid manure, applied one-half in February and one-half in April.
4. { 1 cwt. Nitrate of Soda, applied during last half of March.
   2 cwt. Superphosphate } applied before 15th February.
   2 cwt. Kainit }

(*b*) On Cabbages.

No. of Plot.

1. No manure—size of plot, 1 square perch.
2. 20 tons farmyard manure—size of plot, 4 square perches.
3. 20 tons liquid manure—size of plot, 4 square perches.

B.—SCHEME OF EXPERIMENTS IN THE FEEDING OF LIVE STOCK.

In carrying out experiments with Live Stock many unexpected difficulties will be met with by Instructors. They are, accordingly, advised to undertake only a few experiments of this nature until they have gained experience of the work.

Selection of Farm.

In selecting farmers with whom to locate experiments in the feeding of Live Stock only those should be considered who have been in the habit of feeding pigs, in the case of

experiments with pigs, and cattle in the case of experiments with cattle. Experiments should be undertaken only where full facilities for weighing the animals exist on the farm or in its neighbourhood.

Marking.

All the animals in the experiments should be properly marked for identification, and it is suggested that this could best be done by ear marks, i.e., by cutting notches out. A simple and cheap instrument would then suffice for marking all kinds of stock.

Records.

The herd or other person who is responsible for attending to the feeding operations should keep notes of matters affecting the progress of the experiment, e.g., periods when animals did not fully consume their rations, etc.

Valuing.

Notes should be made by the Instructor of the appearance and value of the animals in the different lots at the beginning and end of the experiment.

Excluding Animals from the Experiment.

If for any reason such as sickness, accident or death any animal is removed from either lot in an experiment, a corresponding animal should be removed from the remaining lot. Particulars as to the foods given to the excluded animals before being removed should be omitted from the returns given in the general report on the results of the experiment.

Weighing of Animals.

The animals are to be weighed at the beginning and at the end of every experiment. It is most important that the weighings should in each case be made under similar conditions, i.e., if at the beginning of the experiment the animals are weighed in the morning after feeding they should be weighed at the same time and under the same conditions at the end of the experiment.

In the case of Experiment V., Fattening of Cattle in Stalls, the animals should not be weighed immediately they are tied up off the grass. Before the commencement of the experiment both lots of cattle should be fed alike for at least one week after they are tied up, and they should be weighed at the end of that period.

With regard to pigs, no difficulty will be experienced in weighing the animals at the beginning of the experiment. Where, however, it is not possible to obtain the live weight of the different pigs, at the end of the experiment these should be calculated, allowing 25 per cent. for loss in killing, and the individual weights so arrived at should be included in the figures submitted to the Department.

Subsidy.

To compensate farmers for the trouble involved in carrying out experiments, a subsidy may be given, subject to the concurrence of the County Committee, calculated on the basis of a certain sum in respect of each animal fed. The maximum amount which may be granted in the case of each class of experiment is given below, but Instructors will, no doubt, be able to arrange in many cases for the carrying out of the experiments at a cost much below the maximum allowable. In addition, a small sum may be given as a gratuity to the farm-hand who is in charge of the immediate work of the experiment. The Instructor should impress on the experimenters that payment of the subsidy will depend on his instructions being satisfactorily carried out. Before any experiment is begun, the Instructor should, of course, obtain the County Committee's and the Department's approval of his proposals for same, which should be submitted in detail.

Further particulars in regard to each class of experiment are given hereunder:—

PIGS.

I.—Experiment to ascertain the value of cooked meals as compared with uncooked meals, for pig feeding.

Details of Experiment.

Lot 1. Cooked meals.

Lot 2. Uncooked meals.

Both lots are to receive equal quantities of the same mixture of meals, and it is suggested that equal parts of Indian meal and pollard be used at the commencement of the experiment. Separated milk or buttermilk, and potatoes, may be given, provided both lots are treated alike in this respect. If potatoes are used they must be given cooked to both lots.

The only difference in the treatment of the two lots must be that the meals for Lot 1 are given cooked and the meals for Lot 2 are fed uncooked. The cooked meals may be either scalded or boiled, and the raw meals are to be damped with cold water.

Drinking water should be provided for the pigs in Lot 2.

Not less than three animals are to be included in each lot. The maximum number of animals in each lot must depend on the funds at the disposal of the Instructor. Pigs should not be less than ten weeks or more than fourteen weeks old at the commencement of the experiment. If possible, pigs between the ages of twelve and fourteen weeks should be selected.

Subsidy for Experiments.

The maximum subsidy payable is 10*s*. per pig (in addition to the allowance for the farm hand, which must not exceed 10*s*. for an entire experiment). The total grant in respect of each experiment must not exceed £5 10*s*.

CATTLE.

II.—Experiment on the Feeding of Calves.

Details of Experiment.

Lot 1. Calf meal recommended by the Department in Leaflet No. 54, viz. :—

2	parts by	weight of	Oatmeal.
2	,,	,,	Indian meal.
1	,,	,,	pure ground Flax seed.

Lot 2. Indian meal alone.

Equal quantities of meal are to be fed to both lots.

A small allowance of linseed cake and crushed oats, mixed in equal proportions, may be given to both lots.

Calves should not be less than four weeks or more than eight weeks old at the commencement of an experiment. The average age of both lots of calves should be as nearly uniform as possible. The minimum number of calves in each lot is to be three. The maximum number must depend on the funds at the Instructor's disposal. The period of experimental feeding should be sixteen weeks.

Subsidy for Experiment.

The maximum subsidy payable is 10*s*. per calf (in addition to the allowance for the farm hand, which must not exceed 10*s*. for an entire experiment). The total grant in respect of each experiment must not exceed £5 10*s*.

III.—Experiment on the Fattening of Cattle on Grass.

Details of Experiment.

This experiment is designed to ascertain whether it is profitable to feed cake and meal to two or three-year-old store cattle on grass, when the pasture is not of first rate quality and when the cattle are intended to be sold fat before autumn.

Lot 1. Cake and meal; mixture composed of :—

2 parts undecorticated cotton cake.

1 part Indian meal.

Lot 2. No cake and meal.

The quantity of the mixtures to be fed to Lot 1 is to commence at 3 lb. per head daily and to increase to 5 lb. per head daily.

The experiment should begin in May and continue for not less than twelve weeks.

The lots are to be fed in two fields and interchanged fortnightly or weekly.

The minimum number of cattle in each lot is to be four. The maximum number must depend on the funds at the Instructor's disposal.

At the end of twelve weeks, or later, when the experiment is concluded, the cattle in Lot 1 will likely be fat and ready for sale, while the cattle in Lot 2 will not be so forward in condition. At the close of the experiment, therefore, it will be necessary to have both lots of cattle valued as well as weighed. If one or both lots are sold the actual prices realised should be given.

Subsidy for Experiment.

The maximum subsidy payable is 10*s*. per head (in addition to the allowance for the farm hand, which must not exceed 10*s*. for an entire experiment). The total grant in respect of each experiment must not exceed £6 10*s*.

IV.—Experiment on the Fattening of Cattle in Stalls.

Details of Experiment.

The objects of this experiment are to ascertain whether cattle can be fed as profitably on a small as on a large ration of roots, and whether part of the roots can be replaced by a mixture of cake and meal in the proportion of 1 lb. meal mixture to 1 stone of roots.

Lot 1. 6 stones roots.

Lot 2. 3 ,,

The concentrated food to be fed to both lots is to consist of a mixture of equal parts of decorticated cotton cake, Indian meal and crushed oats. The quantity of the meal mixture to be given to Lot 1 is to commence at 3 lb. and may increase to 8 lb. per head daily. *Throughout the experiment the cattle in Lot 2 are to receive 3 lb. per head daily of the meal mixture more than those in Lot 1.*

If linseed cake is used during the last stage of the fattening period similar quantities must be fed to both lots, but linseed cake must not be substituted for any portion of the meal mixture referred to above. Equal quantities of the same kind of fodder must be given to both lots.

Drinking water must be offered to all the cattle daily. The minimum number of cattle in each lot is to be four. The maximum number must depend on the funds at the Instructor's disposal. The period during which the experimental feeding is to continue must not be less than ten weeks.

Subsidy for Experiment.

The maximum subsidy payable is £1 per head (in addition to the allowance for the farm hand, which must not exceed 10*s*. for an entire experiment). The total grant in respect of each experiment must not exceed £10 10*s*.

December, 1914.

III.—TECHNICAL INSTRUCTION.

CIRCULAR 89.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN,
December, 1914.

TECHNICAL SCHOOL EXAMINATIONS.

SIR, *or* MADAM,

With reference to the Department's Programme of Technical School Examinations, I have to acquaint you that the Department have decided to include "Drawing from Natural Forms" among the subjects of the Examination of the Third Year of the Courses in Art (Group A.). This subject may be taken as an alternative to the test in "Drawing from Casts" (Subject III. of the Group), and the syllabus and examination will be the same as those for Subject III. of Group C. (Third Year).

I have to request that this alteration in the Programme may be brought to the notice of the Teachers of Art subjects employed by your Managers, and also of intending candidates for examination.

I am,
Sir, *or* Madam,
Your obedient Servant,
T. P. GILL,
Secretary.

CIRCULAR 90.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN,
January, 1915.

SIR,

I have to acquaint you that the Department have been in communication with the Commissioners of National Education respecting the extension of the advantages offered by the Technical Schools

and Classes throughout the country, and have intimated their desire to secure that as many as possible of the pupils of National Schools on leaving the higher standards, should continue their studies at these Schools and Classes. They pointed out that the efforts to secure this object would be greatly assisted if local Committees for Technical Instruction could be supplied at regular intervals, by the teachers of the National Schools in their districts, with particulars of the names and addresses of the pupils leaving the primary schools *on the completion of their National School education.*

The Commissioners, in view of the educational advantages which are likely to result from the proposed continuation of studies at Technical Schools, have issued a memorandum to the Managers of National Schools intimating their desire that such information should be furnished, and requesting them to bring under the notice of their teachers the Commissioners' wish in the matter.

The Department suggest that the Principals of Technical Schools should issue suitably drafted forms to the Head Teachers of the National Schools in their districts, with a request that the information desired may be furnished to them thereon.

I am, Sir,
Your obedient Servant,
T. P. GILL,
Secretary.

CIRCULAR 91.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN,
December, 1914.

INSTRUCTION IN FIRST AID TO THE INJURED, HYGIENE AND EMERGENCY NURSING, AND AMBULANCE WORK.

SIR *or* MADAM,

The Department have had under consideration the conditions under which classes in First Aid to the Injured, etc., have recently been established. In August last, owing to the outbreak of war, there was an urgent demand for this form of instruction, but, owing to the fact that most of the Schools working in connection with the Department were at the time on vacation, and that the officers responsible for the local administration of technical instruction were therefore not available for the work of organisation, the Department deemed it advisable to issue special emergency regulations under which such classes could be formed by any responsible body which would undertake the organisation of classes and the responsibility for the expenses connected therewith.

A very large number of students have now been trained, in classes formed under these Regulations, and have received their certificates. The Department do not regard the formation of classes in these subjects as any longer a matter of urgency, and accordingly they propose to withdraw Section 1 of their Revised Regulations, issued on the 1st October last, and to require that, after the 31st instant

(except in very exceptional circumstances), classes under these Regulations shall be recognised only if conducted under the conditions of a local scheme of Technical Instruction.

Any local Committee (other than a Technical Instruction Committee) recognised under Section 1 of the Revised Regulations will be permitted to conduct classes, after the 31st instant, in Parts II. and III. of the Department's Syllabus, for students who have attended classes in Part I. conducted by the Committee before that date, but applications to conduct further classes in Part I. must be made to the local Technical Instruction Committee. If the Technical Instruction Committee approve of the formation of classes, they will employ the instructor and be responsible for the class expenses, and all correspondence with the Department respecting the classes must be conducted through the Secretary to the Technical Instruction Committee.

Until further notice the Department will continue to hold examinations of classes in Parts I. and II. of the Syllabus of First Aid, etc., which comply with the conditions set out in their Revised Regulations of the 1st October as amended by this Circular Letter.

I am,

Sir *or* Madam,

Your obedient Servant,

T. P. GILL,

Secretary.

FORM S. 31.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

SPECIAL EXAMINATION FOR TEACHERS' QUALIFICATIONS IN MANUAL TRAINING (WOODWORK). 1915.

A Special Examination for Teachers' qualifications in Manual Training (Woodwork) will be held in Dublin on Tuesday and Wednesday, 15th and 16th June, 1915. The subjects and Time Table of the examination will be :—

Tuesday, June 15th .	10 a.m. to 1.30 p.m. .	Drawing.
,, ,, .	2.15 to 5.15 p.m. .	Theory.
Wednesday, June 16th	9.30 a.m. to 1 p.m. .	Drawing on the Black board and Demonstration Exercise.
,, ,, .	2 to 5 p.m. .	Practical Woodwork Test.

For Syllabuses of the subjects of examination see Circular Letter No. 24.

Tools, wood, drawing boards (imperial size), paper, pens and ink will be provided by the Department, but candidates will be required to bring mathematical instruments, pencils, erasers, etc., for the examination in Drawing; and, although tools for the Practical Woodwork Test will be provided by the Department, candidates are advised to bring their own, as no allowance can be made should the candidate not consider the tools supplied as satisfactory.

Applicants for admission to the examination must be twenty-one years of age on or before the 1st January preceding the examination.

Application for admission to the examination must be made, on Form S. 32, not later than the 30th April, and must be accompanied by the examination fee of 10*s*.

Form S. 108.

Department of Agriculture and
Technical Instruction for Ireland,
Upper Merrion Street, Dublin.

I.—SPECIAL EXAMINATIONS FOR TEACHERS' QUALIFICATIONS IN EXPERIMENTAL SCIENCE AND DOMESTIC ECONOMY, 1915.

The Department will hold, in 1915, Special Examinations for Teachers' Qualifications in Experimental Science and Domestic Economy, for Teachers who are actually engaged in teaching in Day Secondary Schools recognised by the Department. Each examination will be divided into two portions, the first a written test to be held on Saturday, the 24th April; and the second a practical test to be held subsequently on a date to be fixed by the Department, and which will be duly notified to candidates. Provisional recognition to give instruction will be granted to those candidates who pass the examination.

If a sufficient number of approved applications are received, examinations will be held in the subjects mentioned below.

The written tests on Saturday, the 24th April, will be held in accordance with the following Time Table:—

From 10 a.m. to 1 p.m.	From 2 p.m. to 5 p.m.
First Year Syllabus of the Preliminary Course.	Second Year Syllabus of the Preliminary Course.
Physics (Third Year Syllabus—General Physics and Heat).	Physics (Fourth Year Syllabus—Course A).
Chemistry (Third Year Syllabus).	Physics (Fourth Year Syllabus—Course B).
Mechanics (Third Year Syllabus).	Chemistry (Fourth Year Syllabus).
Botany (Third Year Syllabus).	Mechanics (Fourth Year Syllabus).
Physiology and Hygiene (Third Year Syllabus).	Botany (Fourth Year Syllabus).
Physical and Commercial Geography (Third Year Syllabus).	Physiology and Hygiene (Fourth Year Syllabus).
Domestic Economy (First Year Training Course).	Physical and Commercial Geography (Fourth Year Syllabus).
Domestic Economy (Third Year Training Course).	Domestic Economy (Second Year Training Course).

A fee of 2*s*. 6*d*. will be charged for examination in each subject, but this fee will not be exigible in the case of a teacher who has, within two calendar years previous to the date of the examination,

made regular attendance at one of the Department's Summer Courses of Instruction for Teachers in the subject of the examination, or who has made not less than 100 hours' attendance at a Summer or other Special Course of instruction in the subject, conducted under the conditions of Section III. of the Departments Programme for Technical Schools and Classes.

Should a sufficient number of applications for examination be received the Department will arrange to hold the written examination at Dublin, Belfast, Cork, Londonderry, Limerick, Waterford and Galway. In very exceptional circumstances other centres might be arranged for, provided that special written application is made by School Managers before the 27th February, 1915.

Application for admission to the examination must be made before the 27th February, 1915, on Form S. 118, copies of which may be obtained, after the 1st January, upon application to the offices of the Department.

II.—REGULATIONS UNDER WHICH THE DEPARTMENT ARE PREPARED TO RECOGNISE SPECIAL COURSES OF INSTRUCTION IN EXPERIMENTAL SCIENCE AND DOMESTIC ECONOMY FOR TEACHERS IN DAY SECONDARY SCHOOLS (See also Section III. of the Programme for Technical Schools and Classes).

The Instructors in charge of classes for Teachers must be specially qualified, and their qualifications must be approved of by the Department for the purposes of the Special Course of instruction.

The Laboratories and Domestic Economy Rooms must also be approved of by the Department for the purposes of the Special Courses of instruction.

Attendance at theoretical instruction may not be taken into account when computing the 100 hours' practical instruction referred to in the fourth paragraph of Section 1 of this form.

Application for the recognition of special classes for Teachers must be made by letter, accompanied by detailed proposals upon Form S. 54. Attendance at lessons previous to the receipt of the Department's written approval of the arrangements may not be reckoned as part of the 100 hours' practical instruction.

FORM S. 125.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

TECHNICAL SCHOOL EXAMINATIONS, 1915.

GENERAL REGULATIONS GOVERNING THE CONDUCT OF THE EXAMINATIONS.

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(1) The Department's Scheme of Technical School Examinations is designed to follow the courses of instruction extending over four years in the following branches of technical knowledge :—

Commerce.
Building Trades.
Applied Chemistry.
Electrical Engineering.
Mechanical Engineering.
Domestic Economy.
Art.

There will be, in general, two examinations in each Course in each of the four years, and the examinations in each Course must be taken in the order prescribed. The Department will not concern themselves with the examination of candidates other than those intending to take out a Course Certificate, except in the case of candidates who wish to obtain one of the Certificates for Teachers of Drawing and Art referred to in Form S. 240.

(2) Examinations in the subjects of the First, Second, Third, and Fourth Years of each Course, will be held in 1915. Candidates will, for the present, be allowed to take the First and Second Year Examinations in the same year; candidates who obtained a success in any one subject of the Second or Third Year of a Course (except an Art Course) in previous years, may take the remaining subject of that Year in 1915 together with the examinations of the next year of the Course; candidates for the Third or Fourth Year Examinations of the Courses in Art must have passed in previous years in at least two subjects of the Second or Third Year respectively; but it must be understood that no candidate can obtain credit for the examinations of any Year unless he shall have passed all the preceding examinations in the Course. Candidates who did not obtain a success in any subject of the Second or Third Year of a Course in previous years are not eligible for admission to the examinations of the Third or Fourth Year of the Course in 1915.

(3) The Examinations will be held in May. The dates on which the Examinations in the various subjects will be held are specified in the Examination Time Table, published separately.

(4) The Syllabuses of the subjects are set out in the Programme of Technical School Examinations (price 2*d.*, postage extra). Copies of the Examination Papers set in 1913 and of the Examiners' Reports have been published in book form. A similar booklet, containing copies of the Papers set in 1914, together with the Examiners' Reports, and copies of the special papers in Geometrical Drawing and Methods of Teaching Drawing, is in preparation and will be issued shortly. These publications may be obtained directly, or through any bookseller, from E. Ponsonby, Limited, 116 Grafton Street, Dublin.

(5) Certificates will not be issued by the Department in respect of the First and Second Year Examinations of any Course. Pass Lists will, however, be issued to the local School Authorities. A "Provisional Certificate" will be issued on the passing of a Third Year Examination (the candidate having already passed in the examinations prescribed for the First and Second Years), and a "Full Course Certificate" on the passing of the Fourth Year Examination, the latter Certificate to have stated upon it the subjects taken in the Course and the Class of success (First or Second) obtained. It is further proposed to issue a "Full Course Honours Certificate" to candidates who pass the further examinations specified in certain Courses.

(6) It is intended that the courses of instruction of which these examinations will provide a test, should include not only theoretical, but practical and laboratory work. In the examinations in Chemical Analysis (*Third Year*) and Technical Analysis (*Fourth Year*), credit will be given for records of work done by candidates, and their laboratory note-books, signed and certified by the teacher, must be retained and made available for examination.

In addition to the theoretical examinations in the Syllabuses prescribed in certain Science subjects (see Programme), candidates may be required to furnish evidence that they have followed a satisfactory course of practical work. Laboratory note-books will be accepted as evidence of this.

(7) The practical tests in the Second, Third, and Fourth Years' Examinations in Applied Chemistry, and in the Third and Fourth Years' Examinations in Mechanical Engineering and Domestic Economy, can only be held in Laboratories or Class-rooms recognised by the Department for the purpose. Schools will, subject to these regulations, be constituted centres for practical or personal examinations only on the understanding that the Managers are prepared to make such special arrangements as will be necessary for these examinations.

Application for Examination Papers.

(8) Managers who wish their Schools to be made Examination Centres must make application for Examination Papers, on Form S. 102, not later than the 18th March. On this Form the Managers will also be required to propose arrangements for the examinations.

Fees for Examination Papers.

(9) An examination fee of 1*s.* 6*d.* will be payable by candidates for each subject of examination prescribed when held by the Department. When the examinations of the City and Guilds of London Institute are prescribed the fee chargeable by that body will be payable by the candidates.

(10) The remittance of the fee for examination papers must be made by Bank Draft, Cheque, or Postal Order, payable to "The Accountant, Department of Agriculture and Technical Instruction for Ireland." *Stamps cannot be accepted.*

Admission of External Candidates.

(11) External candidates (i.e., candidates who are not students of a School which is to be an examination centre) must apply not later than 10th March to the Managers of the School where examinations in the subjects required will be held.

Fees for External Candidates.

(12) Managers may charge external candidates a fee not exceeding 2*s.* 6*d.* for each evening for which they register their names for examination. The admission of external candidates to examinations in Chemical Analysis, Technical Analysis; Engineering Workshop Practice, Domestic Economy (Practical Tests), and Modelling, is not obligatory, and the above-mentioned limitation to the fee will not apply in the case of admission to the examinations in these subjects. These fees are additional to the fees payable to the Department.

Candidates Eligible for Examination.

(13) Though the Examinations are based upon the knowledge which may be acquired in following a definite course of instruction in a Technical School, the Department will not, for the present, require attendance at a Technical School as a qualification for admission to these examinations.

Award of Medals and Prizes.

(14) The regulations for the award of Medals and Prizes by the Department under the Programme of Technical School Examinations have been published separately. Copies may be had upon application to the Department's Offices.

Conjoint Examinations of Two or more Schools.

(15) Where Managers of different Institutions have classes in the same subject under their control they must arrange, where possible, for a conjoint examination of these classes in such a manner that an unnecessary number of rooms may not be in use.

Separate Examinations not held for less than Four Candidates.

(16) A separate examination will not, as a rule, be held where the number of candidates to be presented on any one evening is less than four, but the Department will be prepared, in exceptional circumstances, to approve of examinations being held for a fewer number of candidates, if special written application, setting forth the circumstances, is made not later than the 27th February.

Seating Arrangements.

(17) The accommodation provided must be sufficient to permit of the candidates being so seated that no candidate may be able to overlook the work of another candidate in the same subject, and that candidates may not be able to afford assistance to one another. With the exception of the examinations in Object and Memory Drawing, Drawing from Casts, and Drawing from Natural Forms, the candidates must be seated not less than five feet apart. At the examinations in these Art Subjects candidates may be placed so as to be not less than two feet six inches apart. It is desirable that rooms with level floors and without galleries should be used.

Supply of Examination Requisites.

(18) Managers or their representatives must provide (for use in the examination in those subjects in which they are respectively required) ink, pens, ruled foolscap paper, paper fasteners, tracing paper, and the necessary materials required for examinations in certain Art Subjects, such as, e.g., stands, nails, etc., for hanging up casts ; clay and plaster for modelling, etc.

Despatch of Examination Papers and of Examination Materials.

(19) The examination papers and the materials supplied by the Department for the examinations, will, as a rule, be forwarded to the Examination Secretary, but if the Examination Secretary is ineligible to act as Superintendent (see Section 21 below), the Managers must appoint some other responsible person to act as Custodian of Examination Papers.

(20) The packets of examination papers must not, under any circumstances, be permitted to pass into the hands of a teacher, of a candidate for examination, or of any other person interested in the success of the candidates.

Nomination of Superintendents.

(21) The Managers will nominate, on Form S. 107, certain persons prepared to superintend the examinations. The Superintendents may either be voluntary Superintendents, or they may be remunerated by the Managers, after notice to the Department, at a rate not exceeding 2*s.* 6*d.* per hour of attendance necessary; the Department would not, however, approve of Managers making payments for such services to members of their own body. Candidates for examination, their relatives, their teachers, or other persons who have a direct interest in the success of any candidate, are ineligible to act as Superintendents of Examinations. Managers are held entirely responsible for the presence of Superintendents to the number required at each examination; otherwise the examination may be held to be void. Copies of Form S. 107 will be issued in due course to the Managers of all Centres whose applications (on Form S. 102) for examination papers have been accepted.

Detailed Instructions sent to Secretary.

(22) Detailed Instructions for the conduct of the examinations wlil be addressed in due course to the Examination Secretary.

Cards of Admission to Examinations.

(23) The Department do not issue cards of admission for the use of candidates, but it is desirable that such cards should be prepared and issued by the Managers of the Examination Centres.

Penalties for Infringement of Regulations.

(24) The Department may disallow examinations which afford evidence of not having been conducted in strict accordance with the Regulations; they will investigate cases of suspected irregularity, and may require any or all of the candidates to be re-examined. If any candidate should fail to appear at such investigation, or decline to be re-examined, all his previous examinations may be cancelled. When an examination has failed through no fault of the candidates, a re-examination may be allowed, the cost of which may be charged to the Managers. A re-examination will not be accepted for the purposes of the award of Scholarships, Prizes, etc.

Department not Responsible for Errors.

(25) All possible care is taken that the examination papers may be forwarded in accordance with the applications, and that the results may be issued correctly, but the Department cannot undertake to rectify mistakes, nor will they be responsible for any incidental loss.

Examinations of City and Guilds of London Institute.

(26) The Department do not undertake to make any arrangements for the examination of candidates taking certain of the examinations of the City and Guilds of London Institute prescribed in connection with the Courses in Building Trades (*Fourth Year*),

Applied Chemistry (*Fourth Year*), and Electrical Engineering (*Third and Fourth Years*). Such arrangements must be made by the candidates with the Institute through the Managers of an Examination Centre.

The Department have, however, arranged with the Institute that Candidates in Electrical Engineering (*Course A—Fourth Year*) may be presented for the Institute's Examination in Grade II. of that subject without having previously passed in Grade I. This concession applies only to candidates who have completed the Third Year's Examination of the Course as set out in the Department's Programme.

The names (in full) and dates of birth of candidates who desire exemption in 1915 from the Grade I. Examination in Electrical Engineering of the Institute should be forwarded by the Local Secretary so as to reach the offices of the Department on or before the 27th February.

Special Examinations for Art Teaching Certificates.

(27) Special Examinations in Geometrical Drawing, Perspective, and Methods of Teaching Drawing, in connection with the award of Teachers' Certificates in Art under the conditions of Form S. 240, will be held in May. The regulations governing the conduct of these examinations will, in general, be as set forth above.

IV.—VETERINARY.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

TUBERCULOSIS (IRELAND) ORDER OF 1914.

MEMORANDUM.

The Department of Agriculture and Technical Instruction for Ireland desire to draw attention to the above-named Order which comes into operation on 1st February, 1915. An effect of the Order is to bring within the scope of the existing provisions with regard to bovine tuberculosis *all bovine animals suffering from a chronic cough and showing definite clinical signs of tuberculosis.* Local Authorities are empowered to slaughter any bull, cow, ox, heifer, or calf which they are satisfied is suffering from this form of the disease, and to pay compensation for animals so slaughtered on the same conditions as apply to cows slaughtered as suffering from

tuberculosis of the udder, or as giving tuberculosis milk, and bovine animals slaughtered as suffering from tuberculosis emaciation. The valuation of an animal for the purposes of compensation will be made on one basis only, viz. :— the market value before slaughter; and an animal found to be suffering from tuberculosis emaciation will not necessarily be regarded as a case of advanced tuberculosis.

Under the Order every person having in his possession or under his charge

(i.) any cow which is or appears to be suffering from tuberculosis of the udder, indurated udder, or other chronic disease of the udder; or

(ii.) any bovine animal which is or appears to be suffering from emaciation due to tuberculosis; or

(iii.) any bovine animal which is suffering from a chronic cough and showing definite clinical signs of tuberculosis,

is required to notify the police of the fact without delay, and to keep the animal isolated from other animals as far as practicable (Article 10) until the animal is slaughtered or the permission of the Local Authority for its removal is obtained. He is also required, if the animal be a cow, to take certain precautions with regard to milk and milk vessels (Article 9).

The Order forbids the movement to a Port for shipment of any animal suffering or appearing to be suffering from any of the forms of disease specified in the preceding paragraph, and prescribes steps which may be taken in the event of any such animal being brought to a Port for shipment or exposed for sale in a market, fair-ground, or sale-yard.

The attention of Veterinary Practitioners is directed to Article 3 of the Order which requires notification to the Local Authority of any animal suffering from any of the forms of *tuberculosis* specified in Article 2. It is to be noted that indurated udder or other chronic disease of the udder need not be notified unless the induration or disease is considered tubercular.

Copies of the Order can be obtained by applying to—

The Secretary,
Department of Agriculture and Technical Instruction for Ireland
(Veterinary Branch),
Dublin.

NOTES AND MEMORANDA.

A meeting of the Board of Technical Instruction was held on Wednesday, the 11th November, 1914, at the Offices of the Department, Upper Merrion Street, Dublin. The following were present:—

Meeting of Board of Technical Instruction.

The Right Hon. T. W. Russell, P.C., M.P., Vice-President of the Department, in the Chair; Mr. Christopher J. Dunn, J.P.; Mr. William Macartney, J.P.; Rev. T. A. Finlay, M.A.; Sir John Barr Johnston, J.P.; Mr. John A. M'Clelland, M.A., D.Sc., F.R.S.; Mr. James P. MacGuire, J.P.; Alderman Samuel T. Mercier, J.P.; Alderman William J. Moore, J.P.; Mr. Timothy Ryan; The Most Rev. Richard A. Sheehan, D.D., Lord Bishop of Waterford and Lismore; Mr. Richard Sisk; Mr. Alexander Taylor, and Mr. William Wallace, J.P.

Mr. T. P. Gill, Secretary of the Department; Mr. George Fletcher, Assistant Secretary in respect of Technical Instruction; Mr. H. G. Smith, Chief Clerk; Mr. T. Butler, Superintendent of the Statistics and Intelligence Branch; Mr. W. Vickers Dixon, Senior Inspector of Technical Instruction; Mr. J. V. Coyle, Senior Staff Officer (who also acted as Secretary to the Meeting); Mr. A. Kelly, and Mr. W. Bowers were also present.

A resolution was adopted expressing sympathy with the relatives of the late Mr. James Crozier, J.P., who had for several years been one of the representatives of the City of Dublin on the Board.

Technical Instruction schemes in respect of the session 1914-15 for the Urban Districts of Armagh, Athlone, Ballymena, Bangor, Blackrock, Bray, Carrickfergus, Clonmel, Coleraine, Dalkey, Drogheda, Dromore, Enniscorthy, Galway, Larne, Lurgan (Convent), Lurgan (Municipal), New Ross, Newry, Newtownards, Pembroke, Queenstown, Sligo, Tipperary (Joint Urban and Rural), Tralee, and Wexford, and for the Counties of Antrim, Carlow, Cavan, Clare, Down, Dublin, Kildare, Kilkenny, King's, Londonderry, Louth, Meath, Monaghan, Roscommon, Tipperary (N.R.), Tipperary (S.R.), Waterford, Wexford, and Wicklow, were considered. The schemes were approved and the Board concurred in the allocation of grants in aid thereof from the funds of the Department.

The following among other matters were also under consideration:—Summer Courses for Teachers; Schools for the Training of Domestic Servants; Technical School Examinations and the position of Technical Instruction and Industrial Development in Ireland, as affected by the situation resulting from the European War.

Ireland and the War.

It will be noted that in this issue of the JOURNAL there are several articles dealing more or less directly with the effect of the great European War on Irish agriculture and industries, notably the articles on "The Manufacture of Synthetic Dyes," "The Boom in Flax," "The Production and Value of Irish Timber," "First Aid to the Injured and Emergency Nursing." In the Official Documents are printed an important Memorandum on "Farming and the Food Supply," and a note giving some advice with regard to the artificial manures to be used for this year's crops.

Attention may also be directed to an informative and timely survey of the situation, "The European Crisis and Ireland's Commercial Interests," which appears from the pen of Mr. J. P. Boland, M.P., in the issue for December of *Studies*. The article is a particularly valuable one, a reprint of it has been brought out in pamphlet form by the *Irish Messenger* and can be obtained from the *Irish Messenger* Office, or through any bookseller, at the nominal price of 1*d*. The article should be consulted by all interested in Irish economic development.

Foot and Mouth Disease.

The Departmental Committee on Foot and Mouth Disease appointed by the President of the Board of Agriculture and Fisheries, has submitted its Report (Cd. 2720–1914, price 4½*d*.). The Committee was appointed in June, 1912, to consider the lines of inquiry which might most profitably be followed during investigations in India in order to add to the existing knowledge regarding the characteristics of foot-and-mouth disease and the manner in which the disease is contracted and spread. The whole Report is full of interest, but the Committee's work has suffered much from the fact that it has been found that the Plains cattle, sheep, and swine of India are unsuitable for the purpose of experiments with regard to foot-and-mouth disease, owing to their exceptionally high degree of natural insusceptibility to the disease. The Committee think, therefore, that in the light of the experience gained it would be inadvisable to consider the question of further investigation in India. Having regard, however, to the importance of the subject they make suggestions in relation to future investigation elsewhere. They suggest that a joint International investigation in Europe would be the form most likely to lead to practical results, but they do not think that it would be advisable to carry out experimentation on the mainland. They think that the most desirable arrangement would be a station on an island sufficiently near to a mainland upon which natural outbreaks of the disease are continually occurring so as to enable a practically

unlimited supply of active virus to be obtained. In this connection the Committee point out that Germany and France have established stations on islands, and they suggest the possibility of collaboration for the investigation of foot-and-mouth disease under European conditions.

Fur from German Colony.

Should German South-West Africa come under the British flag, the caracul fur industry of that colony is likely to prove an asset of increasing value. Caracul sheep, which supply the curly black caracul or (to use the trade term) "Persian" lamb fur, were first imported into German South-West Africa from their native Bokhara in 1907, being regarded as specially suited to the sandy soil. Since 1909 there has been a Government farm for the breeding of these sheep near Windhuk. The caracul sheep has been crossed with the native African sheep with the most satisfactory results, and it is now understood, according to the information available at the Imperial Institute, that the industry is an established success, the sheep having found on the higher plateaux of German Damara Land and Namaqua Land climatic conditions not far removed from those of their original habitat. Prices as high as two pounds or even more are obtained for an exceptionally good lambskin, but the industry can, it is believed, be carried on at a profit if each skin realises from ten to fifteen shillings.

In Natal and other parts of the Union of South Africa, where the sheep have also been successfully introduced, little or no attention seems to have been paid to the production of "Persian" lamb skins, the sheep being used there entirely as a source of wool and mutton. A flock of caracul sheep have, however, quite recently been imported into Newfoundland, and the result of the experiment will be awaited with interest.

It may be mentioned that Professor Wallace of Edinburgh has recently advocated a trial of these sheep in these countries, and a promising experiment has been made with them in Scotland.

STATISTICAL

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast.				East Coast.			
	1914.		1913.		1914		1913.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . .	2	6	—	—	14	33	1	1
Soles, ...	17	69	12	64	60	287	15	70
Turbot, . . .	4	11	2	7	29	136	17	82
Total Prime Fish, .	23	86	14	71	103	456	33	153
Cod, ...	34	24	79	60	899	1,098	292	230
Conger Eel, . . .	6	3	—	—	662	365	40	34
Haddock, . . .	—	—	—	—	53	74	57	60
Hake, ...	—	—	—	—	393	520	17	25
Herrings, . . .	5,793	1,718	945	409	6,809	1,878	1,821	757
Ling, ...	—	—	—	—	102	62	22	25
Mackerel, . . .	—	—	47	12	54	16	2	1
Plaice, . . .	129	126	237	226	788	1,096	462	557
Ray or Skate, . .	148	57	234	59	708	314	77	72
Sprats, . . .	—	—	—	—	—	—	—	—
Whiting, . . .	—	—	—	—	404	432	79	72
All other except Shell Fish	69	16	116	57	787	487	234	242
Total, . .	6,202	2,010	1,672	894	11,762	6,798	3,136	2,228
SHELL FISH :—	No.		No.		No.		No.	
Crabs, . . .	300	3	8,364	22	910	8	1,360	7
Lobsters, . .	2,184	52	6,336	201	4,803	125	4,908	186
	Cwt.		cwt.		Cwt.		Cwt.	
Mussels, . .	—	—	—	—	—	—	364	70
	No.		No.		No.		No.	
Oysters, . .	—	—	—	—	5,040	6	2,520	3
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish, .	—	—	—	—	81	38	113	24
Total, . .	—	55	—	223	—	177	—	290
Total value of Fish landed	—	2,065	—	1,117	—	6,975	—	2,518

NOTE.—The above figures are subject

TABLES.

IRELAND.

as landed on the Irish Coasts during the month of October, 1914, as corresponding period in 1913.

South Coast.				West Coast.				Total.			
1914.		1913.		1914.		1913.		1914.		1913.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
4	9	—	—	17	32	14	29	37	80	15	30
31	114	36	152	38	163	24	129	146	633	87	415
2	7	—	—	24	107	12	54	59	261	31	143
37	130	36	152	79	302	50	212	242	974	133	588
5	4	6	6	34	17	60	22	972	1,143	437	318
2	1	—	—	—	—	3	1	670	369	43	35
—	—	—	—	44	21	51	18	97	95	108	78
9	9	7	6	—	—	7	2	402	529	31	33
1,629	626	1,035	474	4,216	1,525	5,385	2,234	18,447	5,747	9,186	3,874
—	—	—	—	—	—	7	4	102	62	29	29
9,342	3,193	5,494	1,676	12,765	5,495	11,333	4,889	22,161	8,704	16,876	6,578
136	156	274	347	130	107	84	84	1,183	1,485	1,057	1,214
6	3	11	4	131	16	145	17	993	370	467	152
10	2	—	—	—	—	—	—	10	2	—	—
9	7	142	25	221	145	147	70	634	584	368	167
96	57	163	71	497	274	298	134	1,449	834	811	504
11,281	4,188	7,168	2.761	18,117	7,902	17,570	7,687	47,362	20,898	29,546	13,570
No.		No.		No.		No.		No.		No.	
—	—	84	1	—	—	—	—	1,210	11	9,808	30
724	26	2,582	115	1,842	52	5,064	182	9,553	255	18,890	684
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
—	—	80	10	1,773	250	2,828	292	1,773	250	3,272	372
No.		No.		No.		No.		No.		No.	
6,048	12	4,536	11	41,412	84	18,207	34	52,500	102	25,263	48
Cwts.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
289	82	394	56	719	107	489	80	1,089	227	996	160
—	120	—	193	—	493	—	588	—	845	—	1,294
—	4,308	—	2,954	—	8,395	—	8,275	—	21,743	—	14,864

to correction in Annual Returns

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned
compared with the

Kinds of Fish.	North Coast.				East Coast.			
	1914.		1913.		1914.		1913.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill,	—	—	—	—	8	18	—	—
Soles,	3	15	2	10	42	187	14	68
Turbot,	1	2	—	—	18	82	19	88
Total Prime Fish,	4	17	2	10	68	287	33	156
Cod,	98	74	244	180	409	611	715	500
Conger Eel,	—	—	—	—	208	166	51	46
Haddock,		3	10	4	70	76	45	39
Hake,	—	—	—	—	190	283	7	10
Herrings,	151	39	5	3	2,711	1,499	13,636	4,831
Ling,	—	—	—	—	50	49	10	12
Mackerel,	—	—	—	—	—	—	—	—
Plaice,	49	48	54	52	856	895	547	663
Ray or Skate,	152	38	144	36	298	193	60	55
Sprats,	—	—	—	—	—	—	—	—
Whiting,	—	—	2	1	334	344	36	33
All other except Shell Fish	113	18	40	20	455	365	219	223
Total,	574	237	501	306	5,649	4,763	15,359	6,568
SHELL FISH :—	No.		No.		No.		No.	
Crabs,	—	—	1,524	3	—	—	—	—
Lobsters,	60	2	312	10	4,081	125	4,458	222
	Cwt.		Cwt.		Cwt.		Cwt.	
Mussels,	—	—	—	—	5	1	—	—
	No.		No.		No.		No.	
Oysters,	—	—	—	—	—	—	1,260	2
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish,	—	—	—	—	44	25	87	19
Total,	—	2	—	13	—	151	—	243
Total value of Fish landed	—	239	—	319	—	1,919	—	6,811

NOTE.—The above figures are subject

IRELAND.

as landed on the Irish Coasts during the month of November, 1914, as corresponding period in 1913.

South Coast.				West Coast.				Total.			
1914.		1913.		1914.		1913.		1914.		1913.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
2	4	1	1	12	25	5	14	22	47	6	15
13	40	15	69	45	192	41	152	103	434	72	299
1	3		—	20	90	26	100	40	177	45	188
16	47	16	70	77	307	72	266	165	658	123	502
9	8	31	29	13	14	1	1	529	707	991	710
—	—	—	—	86	45	—	—	294	211	51	46
—	—	—	—	67	59	83	43	144	138	138	86
—	—	2	3	—	—	15	6	190	283	24	19
142	84	857	395	323	136	912	441	3,327	1,758	15,410	5.670
—	—	—	—	4	2	40	35	54	51	50	47
6,264	2,565	1,842	802	16,400	6,260	3,580	2,055	22,664	8,825	5,422	2,857
81	88	171	178	59	59	45	45	1,045	1,090	817	938
6	1	6	3	131	22	53	18	587	254	263	112
12	2	533	84	—	—	—	—	12	2	533	84
5	5	8	8	138	110	120	77	477	459	166	119
36	27	76	44	142	70	236	222	746	480	571	509
6,571	2,827	3,542	1,616	17,440	7,084	5,157	3,209	30,234	14,916	24,559	11.699
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	—	—	1,524	3
—	—	441	16	942	20	684	20	5,083	147	5,898	268
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
—	—	75	9	1,735	218	1,874	290	1,740	219	1,949	299
No.		No.		No.		No.		No.		No.	
5,544	11	5,166	12	32,232	64	42,684	64	37,776	75	49,110	78
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
404	99	615	201	620	122	496	114	1,068	246	1,198	334
—	110	—	238	—	424	—	488	—	687	—	982
—	2,937	—	1,854	—	7,508	—	3,697	—	15,603	—	12,681

to correction in Annual Returns.

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish	North Coast.				East Coast.			
	1914.		1913.		1914.		1913.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill,	—	—	—	—	17	55	3	6
Soles,	1	6	2	11	32	171	11	49
Turbot,	1	1	—	—	13	59	7	36
Total Prime Fish,	2	7	2	11	62	285	21	91
Cod,	70	55	457	331	342	533	613	420
Conger Eel,	—	—	8	6	130	116	48	42
Haddock,	2	1	90	41	35	46	32	31
Hake,	—	—	—	—	71	141	8	12
Herrings,	30	9	61	36	10,987	5,278	14,391	4,915
Ling,	—	—	—	—	30	23	10	12
Mackerel,	—	—	2,017	627	—	—	—	—
Plaice,	30	30	25	30	194	378	376	613
Ray or Skate,	200	50	129	33	243	190	55	49
Sprats,	—	—	—	—	—	—	—	—
Whiting,	—	—	2	1	359	306	130	108
All other except Shell Fish	70	60	471	128	382	358	210	168
Total,	404	212	3,262	1,244	12,835	7,654	15,894	6,461
SHELL FISH:—	No.		No.		No.		No.	
Crabs,	—	—	264	1	—	—	—	—
Lobsters,	—	—	60	2	1,402	54	4,059	222
	Cwt.		Cwt.		Cwt.		Cwt.	
Mussels,	—	—	—	—	—	—	120	30
	No.		No.		No.		No.	
Oysters,	—	—	—	—	—	—	4,536	7
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish,	—	—	4	1	16	9	87	18
Total,	—	—	—	4	—	63	—	277
Total value of Fish landed	—	212	—	1,248	—	7,717	—	6,738

NOTE.—The above figures are subject

IRELAND.

as Landed on the Irish Coasts during the month of December, 1914, as corresponding period in 1913.

South Coast.				West Coast.				Total.			
1914.		1913.		1914.		1913.		1914.		1913.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
1	1	2	8	—	—	11	22	18	56	16	36
8	34	23	94	1	2	47	186	42	213	83	340
—	—	1	4	1	1	27	133	15	61	35	173
9	35	26	106	2	3	85	341	75	330	134	549
24	24	55	39	52	42	286	127	488	654	1,411	917
—	—	—	—	99	53	69	28	229	169	125	76
—	—	10	10	213	179	303	210	250	226	435	292
—	—	—	—	—	—	—	—	71	141	8	12
5,228	2,342	4,682	1,463	970	553	199	77	17,215	8,182	19,333	6,491
—	—	—	—	24	10	70	39	54	33	80	51
1,370	630	2,857	1,136	1,850	841	20,508	7,895	3,220	1,471	25,382	9,658
17	19	170	191	2	4	144	155	243	431	715	989
2	1	7	4	69	22	116	29	514	263	307	115
309	73	540	87	—	—	—	—	309	73	540	87
1	1	4	3	58	45	198	188	418	352	334	300
49	31	49	24	34	17	199	103	535	466	929	423
7,009	3,156	8,400	3,063	3,373	1,769	22,177	9,192	23,621	12,791	49,733	19,960
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	—	—	264	1
—	—	30	2	192	5	744	28	1,594	59	4,893	254
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
190	49	70	9	679	73	2,241	357	869	92	2 431	396
No.		No.		No.		No.		No.		No.	
5,040	11	5,166	11	321870	638	475,962	931	326,910	649	485,664	949
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
295	86	596	168	738	173	947	210	1,049	268	1,634	397
—	116	—	190	—	889	—	1,526	—	1,068	—	1,997
—	3,272	—	3,253	—	2,658	—	10,718	—	13,859	—	21,957

to correction in Annual Returns.

Statement of the Total Quantity of Fish landed on the English and Welsh Coasts during the Month and Twelve Months ended 31st December, 1914, compared with the corresponding periods of the Year 1913.

Kinds of Fish.	December.		Twelve months ended 31st December.	
	1914.	1913.	1914.	1913.
	Quantity.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill,	**931**	2,151	**18,609**	19,954
Soles,	**2,772**	6,164	**60,472**	66,766
Turbot,	**1,670**	6,817	**55,146**	64,914
Prime Fish not separately distinguished,	—	25	**1,107**	2,460
Total Prime Fish,	**5,373**	15,157	**135,334**	154,094
Bream,	**8,958**	8,833	**99,674**	106,715
Catfish,	**2,032**	2,590	**148,196**	160,190
Coalfish,	**4.475**	13,948	**409,342**	363,499
Cod,	**110,260**	175,400	**2,579,094**	2,646,666
Conger Eels,	**2,133**	5,726	**62,086**	55,181
Dabs,	**7,493**	9,561	**105,818**	107,343
Dogfish,	**6,962**	14,903	**42,178**	64,996
Dory,	**32**	186	**2,044**	2,225
Flounders or Flukes,	**225**	345	**6,785**	6,015
Gurnards,	**3,297**	8,155	**105,560**	105,520
Haddock,	**79,217**	99,453	**1,336,924**	1,553,869
Hake,	**11,921**	30,472	**573,549**	621,360
Halibut,	**2,145**	3,423	**80,965**	106,663
Latchets (Tubs),	**142**	390	**3,001**	2,930
Lemon Soles,	**1,249**	2,871	**46,337**	59,522
Ling,	**3,146**	9,544	**183,189**	214,046
Megrims,	**1,342**	5,048	**76,521**	74,664
Monks (or Anglers),	**1,699**	3,915	**33,907**	38,396
Mullet (Red),	—	16	**75**	222
Plaice,	**20,558**	61,108	**562,239**	699,298
Pollack	**379**	608	**12,874**	12,893
Skates and Rays,	**14,572**	29,385	**344,190**	359,446
Torsk,	**482**	655	**26,902**	31,973
Whiting,	**12,545**	41,654	**358,466**	427,262
Witches,	**712**	3,522	**35,535**	36,266
Herrings,	**50,178**	206,740	**2,016,899**	7,313,425
Mackerel,	**329**	16,798	**278,659**	345,095
Mullet (Grey)	**147**	125	**697**	772
Pilchards,	**25**	355	**45,908**	51,563
Sprats,	**29,422**	45,959	**86,800**	75,156
Whitebait,	**296**	300	**4,346**	5,594
Fish not separately distinguished,	**8,840**	24,123	**320,851**	349,515
Total Wet Fish,	**390,586**	841,268	**10,124,948**	16,152,374
Shell Fish :—	No.	No.	No.	No.
Crabs,	**49,723**	67,558	**4,836,930**	5,567,834
Lobsters,	**3,014**	12,102	**590,514**	634,129
Oysters,	**3,134,792**	3,957,355	**23,902,930**	27,972,714
	Cwt.	Cwt.	Cwt.	Cwt.
Other Shell Fish,	**52,432**	58,811	**587,391**	584,375

Note.—The figures for 1914 are subject to correction.

Statement of the **Total Value** of **Fish** landed on the **English** and **Welsh Coasts** during the Month and Twelve Months ended 31st December, 1914, compared with the corresponding periods of the Year 1913.

Kinds of Fish.	December.		Twelve months ended 31st December.	
	1914.	1913.	1914.	1913.
	Value.			
	£	£	£	£
Brill, ...	4,089	7,551	62,627	71,705
Soles, ...	19,701	42,524	387,774	465,286
Turbot, ...	10,221	33,167	230,830	287,174
Prime Fish not separately distinguished, . . .	—	34	1,752	3,832
Total Prime Fish, .	34 011	83,276	682,983	827,997
Bream, ...	4,889	3,351	35,642	28,527
Catfish, ...	1,929	1,911	70,561	60,834
Coalfish, ...	3,900	7,035	135,286	118,125
Cod, ...	143 193	154,196	1,755,737	1,700,931
Conger Eels, . . .	2,026	4,232	43,630	40,148
Dabs, ...	15,164	9,287	117,100	100,434
Dogfish, ...	3,881	3,688	16,438	20,242
Dory, ...	47	225	1,911	2,315
Flounders or Flukes, . .	212	312	5,197	4,814
Gurnards, ...	1,896	2,892	34,843	34,039
Haddock, ...	107,632	109,678	1,167,578	1,334,519
Hake, ...	21 595	43,004	658,004	656,853
Halibut, ...	10,316	15,868	271,948	349,173
Latchets (Tubs), . . .	153	206	1,936	1,608
Lemon Soles, . . .	6,082	10,971	136,887	162,440
Ling, ...	3,065	6,498	97,069	109,042
Megrims, ...	2,153	4,674	71,277	63,679
Monks (or Anglers), . .	1,493	2,508	21,193	21,747
Mullet (Red), . . .	—	43	243	723
Plaice, ...	54,608	83,784	873,671	1,011,374
Pollack, ...	438	502	9,477	8,819
Skates and Rays, . .	15,040	21,545	268,309	253,729
Torsk, ...	273	549	12,196	12,054
Whiting, ...	16,883	30,379	254,644	280,329
Witches, ...	1,633	5,473	46,846	47,425
Herrings, ...	40,963	98,824	677,804	2,325,084
Mackerel, ...	336	9,513	141,965	167,236
Mullet (Grey), . . .	154	216	1,394	1,627
Pilchards, ...	7	178	16,427	21,865
Sprats, ...	8,560	9,658	21,850	17,794
Whitebait	460	710	8,679	12,717
Fish not separately distinguished, ...	6,371	12,852	187,405	211,083
Total Wet Fish .	509,363	738,038	7,846,130	10,009,326
Shell Fish:—				
Crabs, ...	721	992	53,697	62,037
Lobsters, . . .	160	711	28,908	30,786
Oysters, ...	10,165	13,406	78,515	91,340
Other Shell Fish, . .	7,790	10,884	127,794	143,200
Total Shell Fish, .	18,836	25,993	288,914	327,363
Total Value . .	528,199	764,031	8,135,041	10,336,689

Statement of the **Total Quantity** of the **Fish** landed on the **Scottish Coasts** during the Month and Twelve Months ended 31st December, 1914, compared with the corresponding periods of the year 1913.

Kinds of Fish.	December 1914.	December 1913.	Twelve Months ended 31st December. 1914.	Twelve Months ended 31st December. 1913.
	Quantity			
	Cwt.	Cwt.	Cwt.	Cwt.
Herrings	86,044	52,277	4,383,235	4,449,283
Sprats	11,092	3,665	27,314	8,117
Sparlings	40	15	550	304
Mackerel	1,104	1,771	80,125	74,319
Cod / Codling	38,120	57,781	687,801	872,949
Ling	3,484	6,071	204,237	209,331
Torsk (Tusk)	676	599	18,828	17,254
Saith (Coal Fish)	7,211	25,329	264,602	320,937
Haddocks, Extra Large / Do. Large / Do. Medium / Do. Small	41,505	51,753	555,814	650,930
Whitings	8,374	25,155	222,059	220,060
Conger Eels	290	519	26,611	21,931
Gurnards	507	672	7,219	6,544
Catfish	640	556	26,225	24,941
Monks (Anglers)	1,661	2,605	23,572	24,397
Hake	848	1,096	27,415	18,831
Squids	79	9	161	28
Turbot	279	302	3,989	3,635
Halibut	1,075	1,336	44,567	46,123
Lemon Soles	1,982	1,727	30,568	35,328
Flounders	253	341	7,334	8,148
Plaice, Large / Do. Medium / Do. Small	2,562	3,133	50,937	42,976
Brill	27	39	437	199
Dabs	682	1,024	10,987	9,582
Witches	1,112	4,255	20,051	28,186
Megrims	626	1,390	16,358	18,129
Skates and Rays	4,914	7,729	148,147	133,189
Unclassified kinds	184	773	8,556	14,232
Totals	215,371	251,922	6,897,699	7,259,883
	No.	No.	No.	No.
Shell Fish :—				
Crabs	29,908	61,974	1,565,711	2,176,346
Lobsters	42,962	44,017	646,724	676,999
Oysters	67,300	115,680	704,825	1,316,100
	Cwt.	Cwt.	Cwt.	Cwt.
Clams	110	954	31,883	9,289
Mussels	11,936	10,593	129,417	78,576
Unclassified	1,919	3,460	36,557	40,613

Note.—The above figures are subject to correction in the Annual Returns.

Statement of the TOTAL VALUE of the FISH landed on the SCOTTISH COASTS during the Month and Twelve Months ended 31st December, 1914, compared with the corresponding periods of the year 1913.

KINDS OF FISH.	December.		Twelve Months ended 31st December.	
	1914.	1913.	1914.	1913.
	Value			
	£	£	£	£
Herrings	41,602	26,226	1,339,036	2,088,314
Sprats	4,052	530	8,446	1,772
Sparlings	100	40	1,377	900
Mackerel	581	421	15,652	10,184
Cod / Codling	38,938	41,586	434,047	459,599
Ling	2,153	2,682	76,592	77,242
Torsk (Tusk)	653	276	7,972	6,334
Saith (Coal Fish)	3,188	5,414	55,492	52,233
Haddocks, Extra Large / Do. Large / Do. Medium / Do. Small	41,728	50,409	453,540	516,544
Whitings	9,659	16,320	134,817	103,866
Conger Eels	152	303	11,674	9,956
Gurnards	171	134	1,166	1,040
Catfish	358	258	8,135	6,968
Monks (Anglers)	705	768	6,620	6,562
Hake	1,305	1,322	21,765	15,825
Squids	17	1	32	3
Turbot	1,113	1,136	12,142	12,264
Halibut	3,609	4,520	107,329	107,480
Lemon Soles	7,128	5,330	81,348	81,479
Flounders	209	358	5,868	5,440
Plaice, Large / Do. Medium / Do. Small	6,235	5,193	88,228	67,818
Brill	67	75	812	404
Dabs	455	459	5,149	3,935
Witches	2,398	3,840	24,668	27,820
Megrims	1,572	1,868	23,173	22,037
Skates and Rays	2,051	2,442	44,685	35,322
Unclassified kinds	77	182	1,451	2,016
Totals	170,276	172,093	2,971,216	3,723,357
Shell Fish :—				
Crabs	185	265	12,307	13,964
Lobsters	1,979	2,982	30,074	36,414
Oysters	283	464	2,718	4,757
Clams	16	145	1,254	1,254
Mussels	624	604	7,061	4,371
Unclassified	424	925	11,612	11,205
Totals	3,511	5,385	65,026	71,965
Total Value of all Fish	173,787	177,478	3,036,242	3,795,322

NOTE.—The above figures are subject to correction in the Annual Returns.

Statement of the **Total Quantity** and **Value** of the **Fish** returned as landed on the **Irish Coasts** during the Month and Twelve Months ended 31st December, 1914, compared with the corresponding periods of the Year 1913.

Kinds of Fish.	December. 1914.	December. 1913.	Twelve Months ended 31st December. 1914.	Twelve Months ended 31st December. 1913.
	Quantity.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill,	18	16	425	392
Soles,	42	83	1,718	1,928
Turbot,	15	35	555	560
Total Prime Fish,	75	134	2,698	2,880
Cod,	488	1,411	18,499	20,337
Conger Eel,	229	125	4,878	5,049
Haddock,	250	435	3,435	10,190
Hake,	71	8	3,988	5,115
Herrings,	17,215	19,333	280,697	410,768
Ling,	54	80	3,165	7,213
Mackerel,	3,220	25,382	186,751	131,693
Plaice,	243	715	11,008	11,356
Ray or Skate,	514	307	7,513	6,909
Sprats,	309	540	411	1,464
Whiting,	418	334	8,683	7,324
All other except Shell Fish,	535	929	15,221	16,509
Total,	23,621	49,733	546,947	636,807
Shell Fish :—	No.	No.	No.	No.
Crabs,	—	264	137,653	199,260
Lobsters,	1,594	4,893	412,413	570,428
	Cwt.	Cwt.	Cwt.	Cwt.
Mussels,	869	2,431	9,847	15,138
	No.	No.	No.	No.
Oysters,	326,910	485,664	567,239	639,757
	Cwt.	Cwt.	Cwt.	Cwt.
Other Shell Fish,	1,049	1,634	11,276	16,811
	Value.			
	£	£	£	£
Brill,	56	36	1,030	953
Soles,	213	340	7,445	8,559
Turbot,	61	173	2,482	2,479
Total Prime Fish,	330	549	10,957	11,991
Cod,	654	917	16,342	15,709
Conger Eel,	169	76	3,259	3,813
Haddock,	226	292	3,070	6,692
Hake,	141	12	5,200	6,218
Herrings,	8,182	6,491	93,848	155,464
Ling,	33	51	2,288	5,472
Mackerel,	1,471	9,658	57,796	43,912
Plaice,	431	989	12,968	11,956
Ray or Skate,	263	115	3,382	3,428
Sprats,	73	87	94	214
Whiting,	352	300	6,961	5,480
All other except Shell Fish	466	423	8,249	10,596
Total,	12,791	19,960	224,399	280,945
Shell Fish :—				
Crabs,	—	1	805	1,050
Lobsters,	59	254	13,724	20,801
Mussels,	92	396	1,277	2,124
Oysters,	649	949	1,059	1.226
Other Shell Fish,	268	397	2,672	3,621
Total,	1,068	1,997	19,537	28,822
Total Value of Fish landed,	13,859	21,957	243,936	309,767

Quarterly Average Prices of Crops, Live Stock, Meat, Provisions, &c., for the Quarter ended 31st December, 1914.

Product.	Province.				Ireland.	
	Leinster.	Munster.	Ulster.	Connaught.	1914.	1913.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Crops :—						
Wheat, . . per 112 lbs.	9 5¾	10 2¾	—	—	9 6½	7 4½
Oats (White) . „	8 1¼	8 4½	8 0½	8 1½	8 1¾	5 11½
„ (Black) . „	7 8½	6 11¾	—	—	7 0½	5 4
Barley, . . „	7 5¾	7 3½	—	—	7 3½	7 3¾
Potatoes . „	3 0½	4 0	2 7½	3 1	3 2½	2 10½
Hay (Clover) . „	4 4½	4 4	3 3½	3 8½	3 11¾	3 1½
„ (Meadow) „	3 1½	3 3½	2 0½	2 6¾	3 1½	2 3¾
Grass Seed—						
(Perennial Rye) „	—	—	9 3½	—	9 3½	9 5¾
(Italian Rye) . „	—	—	11 4	—	11 4	12 0½
Flax . . per 14 lbs.	—	—	11 8	—	11 8	6 7¾
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Live Stock —						
Calves (young) per head	2 13 9	2 11 6	1 5 9	2 15 9	2 12 3	2 9 0
Store Cattle—						
Over 6 and not exceeding 12 months per head	5 18 6	5 0 6	5 14 6	6 1 6	5 11 0	5 3 6
One year old and under two years per head	9 10 9	8 18 3	8 11 9	9 6 3	9 1 9	8 16 3
Two years old and under three years per head	13 2 3	11 15 6	11 8 6	12 11 9	12 6 3	11 16 9
Three years old and over „	15 4 9	12 13 9	15 2 3	14 14 3	14 5 0	13 10 3
Fat Cattle—						
Two years old and under three years per head	15 15 0	15 5 6	15 13 6	16 10 0	15 13 3	15 4 0
Three years old and over „	17 17 9	16 12 6	18 1 0	16 13 0	17 5 3	16 7 3
Cows and Bulls per head	14 19 3	13 7 6	15 3 3	14 17 9	13 17 0	13 7 0
Springers—						
Cows and Heifers per head	16 5 6	14 18 0	16 3 6	16 14 9	16 1 9	15 19 3
Milch Cows (down calved) „	15 1 0	14 9 9	14 17 6	14 9 0	14 15 0	14 14 9
Lambs (under 12 months old) per head	1 14 6	1 14 0	1 9 0	1 13 9	1 14 0	1 11 3
Store Sheep—						
One year old and under two years per head	2 0 0	2 1 6	1 15 3	2 2 9	2 1 3	2 0 6
Two years old and over „	1 16 3	1 7 0	1 13 6	2 10 3	2 3 0	1 18 9
Fat Sheep—						
One year old and under two years per head	2 8 0	2 13 0	2 11 3	2 18 6	2 12 0	2 9 6
Two years old and over „	2 9 0	2 7 9	2 3 0	3 0 6	2 10 6	2 7 6
Young Pigs—						
8 to 10 weeks old „	1 2 6	1 3 6	1 10 3	1 6 6	1 7 0	1 12 6
Store Pigs—						
10 weeks to 4 months old „	1 14 6	1 7 9	—	—	1 11 9	1 19 3
4 months old and over „	2 5 3	1 16 6	—	—	1 19 6	2 2 6
Fat Pigs . . „	4 14 0	4 1 0	—	5 0 3	4 17 0	5 10 9
Sows, . . . „	6 8 9	7 2 3	5 14 6	7 4 9	6 16 0	7 11 3
Meat, Provisions, &c.						
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Beef (Live) . per 112 lbs.	—	—	—	—	37 6	33 8
„ (Dead) . „	—	—	—	—	65 9	58 11
Mutton (Live) . „	—	—	—	—	39 0	38 5
„ (Dead) „	—	—	—	—	68 3	67 3
Pork (Dead) . „	55 0	58 3	58 0	56 0	58 0	60 2
Butter (Creamery) „	129 3	127 0	—	—	127 6	121 6
„ (Factory) „	102 9	111 0	—	—	111 0	98 1
„ (Farmers') „	110 9	110 9	112 0	116 6	112 0	98 0
Eggs . . per 120	16 10½	16 4¾	—	15 1½	16 4½	14 2¾
Wool . . per lb.	1 2½	—	—	—	1 2½	0 11¾

Weekly Average Prices of **Wheat, Oats,** and **Barley,** per 112 lbs. computed from Market Returns of certain quantities of these Cereals supplied by Officers of Customs and Excise, during the **Quarter** ended 31st December, 1914.

Returns received in the Week ended		Wheat.		Oats.		Barley.	
		Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity
1914.		s. d.	Cwts. of 112 lbs.	s. d.	Cwts. of 112 lbs.	s. d.	Cwts. of 112 lbs.
October	3	9 0¼	2,370	6 9	34,400	7 4¼	10,640
„	10	8 11	2,195	6 9	32,984	7 3½	15,250
„	17	9 0	1,000	6 9¾	20,418	7 3¼	13,700
„	24	9 6½	750	6 10¾	12,745	7 3	9,238
„	31	9 7	925	7 6	14,850	7 1	4,808
November	7	10 0	1,012	7 11½	16,701	7 3	1,830
„	14	10 7½	512	8 3¾	14,201	7 5½	488
„	21	10 7½	516	8 8	8,866	8 6	221
„	28	11 5¼	245	8 7¼	11,933	7 9	62
December	5	10 11¼	183	8 6½	8,301	—	—
„	12	10 11¼	155	8 8	9,358	—	—
„	19	10 9½	125	8 6	6,670	—	—
„	26	10 9½	125	8 7	2,705	—	—

Quarterly Average Prices of **Fat Cattle** and **Fat Sheep,** per 112 lbs., **Live Weight,** sold in **Dublin Markets** during the period ended 31st December, 1914, and also for the corresponding period during seventeen preceding years.

Year.	Fat Cattle.	Fat Sheep.	Year.
	£ s. d.	£ s. d.	
1914,	1 17 6	1 19 0	1914.
1913,	1 13 8	1 18 5	1913.
1912,	1 10 4	1 10 10	1912.
1911,	1 12 7	1 10 6	1911.
1910,	1 12 1	1 12 1	1910.
1909,	1 11 9	1 8 5	1909.
1908,	1 11 4	1 11 6	1908.
1907,	1 9 6	1 15 7	1907.
1906,	1 9 0	1 17 10	1906.
1905,	1 8 3	1 14 6	1905.
1904,	1 9 2	1 15 0	1904.
1903,	1 9 5	1 13 10	1903.
1902,	1 11 5	1 12 3	1902.
1901,	1 9 11	1 10 3	1901.
1900,	1 10 7	1 12 4	1900.
1899,	1 10 8	1 12 4	1899.
1898,	1 7 9	1 11 5	1898.
1897,	1 8 2	1 12 7	1897.

Number of Animals included in Returns furnished under the Markets and Fairs (Weighing of Cattle) Act, 1891, Sections 3 and 4, during the Quarter ended 31st December, 1914.

Week Ended	Fat Cattle.					Fat Sheep.			
	Dublin.		Belfast.		Total Number of Cattle included in Returns.	Dublin.		Belfast.	Total Number of Sheep included in Returns.
	Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	Mr. John Robson, Auctioneer.		Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	
1914.									
October 1 . .	87	246	69	41	443	—	272	—	272
,, 8 . .	46	169	68	67	3[illegible]0	—	111	—	111
,, 15 . .	52	174	72	122	420	—	321	—	321
,, 22 . .	62	163	67	51	343	—	334	—	334
,, 29 . .	98	219	73	42	432	—	187	—	187
November 5 . .	91	252	67	48	458	—	217	—	217
,, 12 . .	92	242	67	55	456	—	240	—	240
,, 19 . .	129	228	65	49	471	—	357	—	357
,, 26 . .	88	230	71	67	456	—	211	—	211
December 3 . .	56	146	67	49	318	—	159	—	159
,, 10 . .	54	159	70	49	3[illegible]2	—	143	—	143
,, 17 . .	62	191	64	63	380	—	166	—	166
,, 24 . .	30	119	68	—	217	—	40	—	40
,, 31 . .	52	1[illegible]9	63	53	307	—	196	—	196
Totals, . .	99[illegible]	2,677	951	756	5,383	—	2,954	—	2,954

BUTTER PRICES DURING THE QUARTER

ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW,"

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the an Irish Creamery would be 5*s*. to 7*s*. per cwt. less than freight, commission,

COUNTRY OF ORIGIN	Type of Package,	Place of Sale.	WEEK ENDED OCTOBER 3rd.	10th.	17th.	24th.
			Per owt *s. s.*	Per owt. *s. s.*	Per owt. *s. s.*	Per owt. *s. s.*
IRELAND— Creamery Butter,	Kiels, kegs, or pyramid boxes	London, .	124–130	126–134	126–134	124–132
		Liverpool, .	125–134	126–134	126–133	125–130
		Bristol, .	124–136	128–136	128–137	128–135
		Cardiff, .	128–133	130–135	130–136	127–134
		Manchester, .	124–132	130–135	132–138	129–137
		Birmingham, .	128–130	132–134	133–135	132–134
		Glasgow, .	126–128	130–132	134–135	131–132
		Limerick, .	—	—	—	—
		Cork, .	—	—	—	—
		Belfast, .	—	—	—	—
		Dublin, .	128–138	128–138	130–133	130–133
	1lb. rolls, in boxes, Salted or Unsalted.	F.O.R., .	135/4–140	135/4–140	135/4–140	135/4–140
Factories, .		London, .	104–116	110–125	110–125	111–124
		Liverpool, .	108–112	110–116	112–116	112–116
		Bristol, .	102–120	106–120	112–122	110–115
		Cardiff, .	116–118	108–116	108–120	108–120
		Manchester, .	—	—	—	—
Farmers' Butter,	Firkins 1st, Export Price	Cork, .	107–109	109	109–110	111
	Do. 2nd ,,	Cork, .	100–104	102–106	106–107	107–109
	Do. 3rd ,,	Cork, .	93–95	94–98	99	103
	Fresh, .	Cork, .	111–112	112–113	116–117	114–117
			Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
FRANCE, .	12×2lb. rolls,	London, .	10/6–13/6	11–14	11–14	11/6–14/6
			Per cwt.	Per cwt.	Per cwt.	Per cwt.
	Paris baskets,	do., .	106–117	112–122	112–122	122–126
DENMARK AND SWEDEN		Copenhagen Quotation.	118 Kr. per 50 Kilos = 130/1 per cwt.	121 Kr. per 50 Kilos = 132/3 per cwt.	121 Kr. per 50 Kilos = 132/3 per cwt.	118 Kr. per 50 Kilos = 129/- per cwt.
		Average over-price.	—	—	—	—
	Kiels, .	London, .	138–142	142–146	142–146	140–142
		Liverpool, .	136–144	142–146	140–146	137–141
		Bristol, .	—	—	—	—
		Cardiff, .	144	154	156	152–154
		Manchester, .	134–140	140–146	142–148	136–144
		Birmingham, .	138–140	144–148	146–149	144–147
		Newcastle-on-Tyne,	130–137	142–148	142–147	136–144
		Glasgow, .	135–136	142–143	142–143	140–142
		Leith, .	138–140	146–147	148	138–142
		Hull, . .	135–140	135–143	142–146	140–142
	1lb. rolls, 10×24 lb. boxes.	F.O.R. London	—	—	—	—
FINLAND .	Kiels, .	Manchester, .	133–134	130–140	130–141	126–138
		Liverpool, .	—	—	—	—
		Hull, . .	127–129	127–135	136–137	134–135
		Cardiff, .	—	—	—	—

ENDED 31st DECEMBER, 1914.

"Grocer's Gazette," and Other Trade Reports.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED								
	November.				December.			
31st.	7th.	14th.	21st.	28th.	5th.	12th.	19th.	26th.
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.
122-130	122-128	122-128	122-130	122-131	126-132	—	—	—
124-128	120-130	126-133	130-135	130-134	132-138	134-140	136-140	136-140
128-136	132-134	132-134	128-134	128-136	130-138	—	—	—
126-134	126-132	128-135	128-136	130-140	132-140	138-140	140	140
125-131	124-129	127-134	132-136	134-139	134-140	138-144	142-150	142-150
128-132	126-130	128-132	132-134	131-136	136-138	138-140	—	—
130-131	130-131	132-134	133-134	—	134-135	136-138	138-139	138-139
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
130-133	126-130	128-135	133-135	133-138	137-140	138-142	146-148	148-150
130/8-140	130/8-140	135/4-144/8	140-144/8	144/8-149/4	149/4	149/4	154	158/8
112-120	108-120	108-120	110-123	118-121	—	—	—	—
112-114	110-114	112-116	114-119	115-120	115-120	118-122	120-126	120-126
110-122	112-116	—	114-122	114-124	115-126	120-126	122-130	—
112-114	112-118	111-118	111	115-124	120-125	120-130	122-126	—
—	—	—	—	—	—	—	—	—
111	111	111	111-118	118-124	122-124	125-129	131-135	135-139
105-108	108-110	106-109	109-115	114-115	112-115	116-118	119-122	120-121
—	—	99	—	112	—	—	118	—
112-117	113-117	116-118	118-120	121-124	124	124-131	131-136	131-138
Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
11/6-14/6	11-14	11/6-14/6	11/6-14/6	12-15	12-15	12/6-15/6	13-16	—
Per cwt.	Per cwt.	Per cwt	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
117-126	113-122	117-126	117-126	122-131	122-131	126-135	130-139	—
115 Kr. per 50 Kilos = 125/9 per cwt.	115 Kr per 50 Kilos = 125/9 per cwt.	117 Kr. per 50 Kilos = 127/11 per cwt.	120 Kr. per 50 Kilos = 131/2 per cwt.	124 Kr. per 50 Kilos = 135/7 per cwt.	127 Kr. per 50 Kilos = 138/10 per cwt.	132 Kr. per 50 Kilos = 144/4 per cwt.	133 Kr. per 50 Kilos = 145/5 per cwt.	133 Kr. per 50 Kilos = 145/5 per cwt.
—	—	—	—	—	—	—	—	—
134-138	132-138	136-139	139-142	143-146	147-149	150-156	150-154	—
132-137	131-138	135-138	134-143	140-148	144-152	149-158	154-160	155-160
—	—	—	—	—	—	—	—	—
148	136-138	140	141	148	152	152	160	161
130-138	126-136	132-138	135-140	138-144	143-148	147-152	151-157	156-159
136-139	134-137	134-138	138-140	142-144	147-149	150-152	155-157	156-158
130-138	130-135	133-138	135-141	139-146	143-145	147-156	153-159	148-157
135-136	132-133	132-134	137-138	—	146-147	147-149	152-154	155-156
133-136	130	—	137-138	141	146	149-150	154	—
137-140	133-134	130-132	134-135	139-146	143-145	149-154	150-152	153-155
—	—	—	—	—	—	—	—	—
120-133	122-130	128-134	130-137	139-141	142-146	145-149	149-154	153-157
—	—	—	—	—	—	—	—	—
129-131	126-128	126-128	130-132	135-136	139-141	142-143	147-148	147-148
—	—	—	—	—	—	—	—	—

[Continued on pages 458 and 459.

BUTTER PRICES DURING THE QUARTER

Abstracted from "The Grocer," "Grocer's Review,"

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the an Irish Creamery would be 5*s.* to 7*s.* per cwt. less than freight, commission,

Country of Origin.	Type of Package.	Place of Sale.	Week Ended.			
			October			
			3rd.	10th.	17th.	24th.
			Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
Russia and Siberia,	Kiels,	London,	118–122	120–124	120–124	120–124
		Liverpool,	122–124	122–126	122–126	122–124
		Bristol,	118–128	118–128	120–128	126–128
		Cardiff,	120–126	121–126	123–126	122–126
		Manchester,	—	123–124	—	—
		Birmingham,	—	120–124	122–126	122–126
		Glasgow,	—	—	—	—
		Leith,	115–120	112–122	124	—
		Hull,	—	—	—	—
Holland,	Boxes,	London,	120–126	126–130	—	—
	Rolls,	do.,	14/6–15	15–15/6	—	—
	Boxes,	Glasgow,— Fresh,	—	—	—	—
		Salt,	—	—	—	—
		Manchester,	—	—	—	—
		Hull,	128–129	128–135	140–142	130–141
			Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
Italy,	Rolls,	London,	—	—	—	—
			Per cwt.	Per cwt.	Per cwt.	Per cwt.
Canada,	56 lb. Boxes,	London,	—	—	—	—
		Liverpool,	—	—	—	—
		Bristol,	124–130	128–134	130–134	130–134
		Cardiff,	126–128	132	—	—
		Birmingham,	—	—	—	—
		Manchester,	—	—	—	—
		Glasgow,	—	—	—	—
Australia and New Zealand, *	Boxes,	London,	A.s.120–124 u.122–126	A.s.124–128 u. 124–128	A.s.124–128 u. 126–130	A.s.124–128 u. 126–130
			Z. —	Z. —	Z. —	Z. —
		Liverpool,	A. —	A. —	A. —	A. —
			Z. —	Z. —	Z. —	Z. —
		Bristol,	A. 116–124	A. 120–128	A. 120–128	A. 120–128
			Z. 134–138	Z. 134–138	Z. 134–138	Z. 134–138
		Cardiff,	A. —	A. —	A. —	A. —
			Z. —	Z. —	Z. —	Z. —
		Manchester,	A. —	A. —	A. —	A. —
			Z. —	Z. —	Z. —	Z. —
		Birmingham,	A. —	A. —	A. —	A —
			Z. —	Z. —	Z. —	Z. —
		Glasgow,	A. —	A. —	A. —	A. —
			Z. —	Z. —	Z. —	Z. —
		Leith,	A. —	A. —	A. —	A. —
			Z. —	Z. —	Z. —	Z. —
		Hull,	A. —	A. —	A. —	A. —
			Z. —	Z. —	Z. —	Z. —
Argentina,	Boxes,	London,	118–122	120–126	122–126	126–130
		Liverpool,	—	—	—	—
		Bristol,	—	—	—	—
		Cardiff,	—	—	—	—
		Manchester,	—	—	—	—
		Birmingham,	—	—	—	—
		Glasgow,	—	—	—	—
United States,	Tubs and boxes,	London,	—	—	—	—
		Liverpool,	—	—	—	—
		Bristol,	—	—	—	—
		Cardiff,	—	—	—	—
		Manchester,	—	—	—	—

A.—Australia. Z.—New Zealand. s.—salted. u.—unsalted.

ENDED 31st DECEMBER, 1914—*Continued.*

"Grocer's Gazette," and other Trade Reports.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED.								
	November				December			
31st.	7th.	14th.	21st.	28th.	5th.	12th.	19th.	26th.
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.
118-122	118-122	118-120	118-122	120-122	120-124	122-126	126-130	—
120-126	120-124	121-124	122-126	122-126	122-128	125-130	127-130	128-132
120-128	124-126	120-128	122-127	122-127	122-128	126-130	130-132	132-134
122-128	122-128	122-128	120-126	118-126	124-127	128	128	—
—	114-122	122-124	122-126	120-126	123-127	125-128	126-130	125-134
120-122	120-122	121-122	—	122-124	124-126	—	130-132	130-132
—	—	—	—	—	126-128	—	—	—
—	114-116	—	118-122	118-123	118-122	—	—	—
—	—	—	—	—	—	—	—	—
122-126	120-126	122-124	128-130	—	—	—	—	—
15-15/6	14/6-15	14/6-15	14/6-15	15/6-16	16/6-17	16-17	16-17	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	150-152	—	—
—	—	—	—	—	—	—	—	—
137-138	132-133	130-131	133-135	138-140	148-150	151-152	156-158	156-158
Per doz. lbs.	Per doz.lbs.	Per doz.lbs.	Per doz.lbs.	Per doz.lbs.	Per doz.lbs.	Per doz.lbs.	Per doz.lbs.	Per doz.lbs.
—	—	—	—	—	—	—	—	—
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
130-134	—	130-132	—	128-130	130-132	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
A.s.124-126	A.s.122-126	A.s.122-126	A.s.124-128	A.s.124-130	A.s.128-132	A.s.130-136	A.s.134-136	A.s. —
u.124-128	u. 124-128	u. 124-130	u.124-130	u.126-130	u.128-132	u.130-136	u.134-138	u. —
Z. —	Z. —	Z. 126-130	Z. 128-132	Z. 130-134	Z. 132-134	Z. —	Z. 136-140	Z. —
A. —	A. 126-128	A. 126-131	A. 127-132	A. 128-134	A. 130-138	A. 132-138	A. 136-140	A. 136-140
Z. —	Z. —	Z. 132-134	Z. 129-136	Z. 132-138	Z. 134-140	Z. 136-144	Z. 138-143	Z. 138-144
A. 132	A. 136-138	A. 130-132	A. 130-132	A. 129-134	A. 132-136	A. 136-138	A. 140-142	A. 138-140
Z. 134-138	Z. —	Z. 134-136	Z. 132-136	Z. 134-138	Z. 136-138	Z. 138-142	Z. 142-144	Z. 142-144
A. —	A. —	A. 135	A. 132-134	A. 132-134	A. 132-136	A. 135-140	A. 141-143	A. 140-143
Z. —	Z. —	Z. 130-132	Z. 132-136	Z. 134-136	Z. 136-140	Z. 142-144	Z. 140-145	Z. 140-145
A. —	A. —	A. —	A. 129-131	A. 128-132	A. 130-133	A. 134-137	A. 136-141	A. 138-140
Z. —	Z. —	Z. 130-132	Z. 132-134	Z. 132-135	Z. 135-137	Z. 138-140	Z. 138-142	Z. 142-144
A. —	A. —	A. —	A. 128-130	A. 130-132	A. 132-134	A. 134-138	A. 138-140	A. 139-141
Z. —	Z. —	Z. —	Z. 132-133	Z. 134-136	Z. 136-138	Z. 138-140	Z. 141-142	Z. 142-143
A. —	A. —	A. 130-134	A. 131-132	A. —	A. 135-136	A. 138-139	A. 138-139	A. 138-139
Z. —	Z. —	Z. —	Z. 132-134	Z. —	Z. 136-137	Z. 138-139	Z. 140-142	Z. 140-142
A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —
Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —
A. —	A. —	A. 124-126	A. 124-126	A. 128-130	A. 130-131	A. 134-135	A. 138-140	A. 137-138
Z. —	Z. —	Z. 128-130	Z. 126-130	Z. 131-133	Z. 133-135	Z. 136-137	Z. —	Z. 138-140
120-128	120-124	120-126	120-126	122-128	128-132	128-132	132-136	—
—	—	—	124-126	—	127-133	130-131	133-139	134-139
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	130	—	136-138	140-142
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—

TABLES SHOWING THE EXPORTS

TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT
the PORTS OF EMBARKATION

IRISH PORTS.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina, .	294	10	—	—	239	—	543	2,251	—	—	2,251
Belfast, .	14,367	37,604	1,775	2,668	126	431	56,971	3,429	—	—	3,429
Coleraine .	1	290	—	1	11	—	303	—	—	—	—
Cork, .	15,689	26,319	1,036	2,305	1,847	8,300	55,496	3,894	397	—	4,291
Drogheda, .	13,346	5,065	318	42	—	9	18,780	4,764	—	—	4,764
Dublin, .	119,995	37,447	8,774	897	241	6,928	174,282	53,763	—	—	53,763
Dundalk, .	9,460	11,799	415	277	—	—	21,957	13,454	166	—	13,620
Greenore, .	46	1,722	357	304	—	—	2,429	211	—	—	211
Larne, .	105	10,696	2	108	—	831	11,742	351	106	—	457
Limerick, .	—	—	—	—	—	—	—	—	—	—	—
Londonderry,	4,735	25,273	266	762	1,664	2,721	35,421	3,830	2,070	—	5,900
Milford, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Newry, .	620	3,669	16	7	—	—	4,312	3,304	—	—	3,304
Portrush, .	—	—	—	—	—	—	—	—	—	—	—
Sligo, .	917	289	—	—	—	—	1,206	878	—	1,058	1,936
Waterford, .	27,888	20,805	587	56	—	1,927	51,263	9,017	—	—	9,017
Westport, .	294	46	—	—	65	—	405	2,389	—	—	2,389
Wexford, .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	207,763	181,034	13,546	7,427	4,193	21,147	435,110	101,535	2,739	1,058	105,332

TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT
the PORTS OF DEBARKATION

BRITISH PORTS.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total	Fat.	Stores.	Lambs.	Total.
Ardrossan, .	—	—	—	—	—	—	—	—	—	—	—
Ayr, .	1,941	19,559	81	472	—	159	22,212	351	—	—	351
Barrow, .	11	1,062	41	126	—	—	1,240	—	—	—	—
Bristol, .	1,933	13,725	704	276	—	1,920	18,558	4,586	207	—	4,793
Cardiff, .	—	—	—	—	—	—	—	—	—	—	—
Dover .	—	—	—	—	—	—	—	—	—	—	—
Falmouth, .	—	—	—	—	—	—	—	—	—	—	—
Fishguard, .	7,685	24,394	726	1,552	385	5,858	40,600	5,338	190	—	5,528
Fleetwood, .	1,100	2,947	1,105	545	1	21	5,719	2,492	—	—	2,492
Glasgow, .	28,350	32,772	2,300	2,079	3,638	6,287	75,426	826	—	93	919
Greenock, .	5,288	9,880	111	63	56	569	15,967	403	—	—	403
Heysham, .	8,565	20,736	3,097	492	—	445	33,335	4,003	2,070	—	6,073
Holyhead, .	18,888	11,323	2,119	683	27	973	34,013	5,796	—	—	5,796
Liverpool, .	117,821	33,145	3,101	1,058	86	3,967	159,178	65,296	166	965	66,427
London, .	—	—	—	—	—	—	—	—	—	—	—
Manchester, .	12,526	215	159	1	—	101	13,002	12,391	—	—	12,391
Newhaven, .	—	—	—	—	—	—	—	—	—	—	—
Plymouth, .	225	—	—	—	—	—	225	—	—	—	—
Preston, .	—	—	—	—	—	—	—	—	—	—	—
Silloth, .	3,384	1,915	—	—	—	116	5,415	53	—	—	53
Southampton,	—	—	—	—	—	—	—	—	—	—	—
Stranraer, .	46	9,361	2	80	—	731	10,220	—	106	—	106
Whitehaven,	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	207,763	181,034	13,546	7,427	4,193	21,147	435,110	101,535	2,739	1,058	105,332

AND IMPORTS OF ANIMALS.

I.

BRITAIN during the Three Months ended 31ST DECEMBER, 1914, showing IN IRELAND.

Swine.			Goats.	Horses.				Mules or Jennets	Asses.	Total Animals	Irish Ports.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
1,537	—	1,537	3	—	—	—	—	—	—	4,334	Ballina.
4,380	84	4,464	4	20	453	790	1,263	1	4	66,136	Belfast.
10	—	10	—	—	1	1	2	—	—	315	Coleraine.
5,245	—	5,245	—	2	125	162	289	—	9	65,330	Cork.
922	21	943	2	—	1	8	9	—	—	24,498	Drogheda.
39,678	—	39,678	4	32	708	501	1,241	4	3	268,975	Dublin.
10,696	15	10,711	45	—	141	67	208	—	—	46,541	Dundalk.
12	—	12	1	—	107	62	169	—	—	2,822	Greenore.
19	45	64	1	—	40	84	124	—	—	12,388	Larne.
—	—	—	—	—	—	—	—	—	—	—	Limerick.
4,340	9	4,349	4	2	37	48	87	—	7	45,768	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Milford.
—	—	—	—	—	—	—	—	—	—	—	Mulroy.
824	—	824	—	—	1	3	4	—	—	8,444	Newry.
—	—	—	—	—	—	—	—	—	—	—	Portrush.
5,739	—	5,739	8	—	1	2	3	—	—	8,892	Sligo.
10,850	—	10,850	—	7	53	88	148	—	—	71,278	Waterford.
64	—	64	—	—	—	—	—	—	—	2,858	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
84,316	174	84,490	72	63	1,668	1,816	3,547	5	23	628,579	TOTAL.

II.

BRITAIN during the Three Months ended 31ST DECEMBER, 1914, showing IN GREAT BRITAIN.

Swine.			Goats.	Horses.				Mules or Jennets	Asses.	Total Animals	British Ports.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings.	Total.				
—	—	—	—	—	80	188	268	1	—	269	Ardrossan.
3,030	83	3,113	—	19	83	137	239	—	1	25,916	Ayr.
550	—	550	2	—	—	—	—	—	—	1,792	Barrow.
808	—	808	—	—	—	2	2	—	2	24,163	Bristol.
—	—	—	—	—	—	—	—	—	—	—	Cardiff,
—	—	—	—	—	—	—	—	—	—	—	Dover
—	—	—	—	—	—	—	—	—	—	—	Falmouth
10,079	—	10,079	—	8	151	200	359	—	6	56,572	Fishguard.
121	—	121	2	1	92	147	240	—	2	8,576	Fleetwood
4,423	10	4,433	4	1	143	167	311	3	5	81,101	Glasgow.
380	—	380	—	1	—	2	3	—	1	16,754	Greenock.
2,892	—	2,892	—	2	154	192	348	—	4	42,652	Heysham.
24,434	—	24,434	2	28	638	434	1,100	—	1	65,346	Holyhead.
36,097	36	36,133	61	2	254	218	474	1	—	262,274	Liverpool.
—	—	—	—	—	—	—	—	—	—	—	London.
334	—	334	—	1	4	7	12	—	—	25,739	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
315	—	315	—	—	26	38	64	—	1	605	Plymouth.
—	—	—	—	—	4	6	10	—	—	10	Preston.
848	—	848	—	—	1	1	2	—	—	6,318	Silloth.
—	—	—	—	—	1	3	4	—	—	4	Southampton.
5	45	50	1	—	37	74	111	—	—	10,488	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Whitehaven.
84,316	174	84,490	72	63	1,668	1,816	3,547	5	23	628,579	TOTAL.

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT
the PORTS OF

IRISH PORTS.	CATTLE.							SHEEP.			
	Fat	Stores (fattening)	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina, .	—	—	—	—	—	—	—	—	1	—	1
Belfast, .	—	—	—	—	22	—	22	342	4,250	—	4,592
Coleraine, .	—	—	—	—	—	—	—	—	—	—	—
Cork .	—	—	—	—	—	—	—	—	5	—	5
Drogheda, .	—	—	—	—	—	—	—	—	—	—	—
Dublin, .	—	23	2	—	—	2	27	80	1,942	107	2,129
Dundalk, .	—	—	—	—	—	—	—	—	—	—	—
Greenore, .	—	—	—	—	1	—	1	—	—	—	—
Larne, .	—	—	4	—	—	—	4	—	246	—	246
Limerick, .	—	—	—	—	—	—	—	—	—	—	—
Londonderry,	—	6	—	—	—	—	6	—	675	91	766
Milford, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Newry, .	—	—	—	—	—	—	—	—	—	—	—
Portrush, .	—	—	—	—	—	—	—	—	—	—	—
Sligo, .	—	—	—	—	—	—	—	—	21	—	21
Waterford, .	—	12	—	—	1	—	13	—	62	—	62
Westport, .	—	—	—	—	—	—	—	—	2	—	2
Wexford, .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	—	41	6	—	24	2	73	422	7,204	198	7,824

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT
the PORTS of EMBARKATION

BRITISH PORTS.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ardrossan, .	—	—	—	—	11	—	11	99	1,615	—	1,714
Ayr, .	—	—	—	—	1	—	1	243	2,561	—	2,804
Barrow, .	—	—	—	—	—	—	—	—	—	—	—
Bristol, .	—	—	—	—	—	—	—	—	—	—	—
Cardiff, .	—	—	—	—	—	—	—	—	—	—	—
Falmouth, .	—	1	2	—	—	—	3	—	—	—	—
Fishguard, .	—	12	—	—	—	—	12	—	1	—	1
Fleetwood, .	—	—	—	—	—	—	—	—	—	—	—
Glasgow, .	—	7	—	—	10	2	19	80	2,583	61	2,724
Greenock, .	—	—	—	—	—	—	—	—	158	137	295
Heysham, .	—	—	—	—	—	—	—	—	—	—	—
Holyhead, .	—	2	—	—	1	—	3	—	2	—	2
Liverpool, .	—	—	—	—	1	—	1	—	11	—	11
London, .	—	—	—	—	—	—	—	—	—	—	—
Manchester, .	—	—	—	—	—	—	—	—	—	—	—
Newhaven, .	—	—	—	—	—	—	—	—	—	—	—
Plymouth, .	—	—	—	—	—	—	—	—	—	—	—
Preston, .	—	—	—	—	—	—	—	—	—	—	—
Silloth, .	—	19	—	—	—	—	19	—	51	—	51
Southampton,	—	—	—	—	—	—	—	—	—	—	—
Stranraer .	—	—	4	—	—	—	4	—	222	—	222
Swansea, .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	—	41	6	—	24	2	73	422	7,204	198	7,824

III.

Britain during the Three Months ended 31st December, 1914, showing Debarkation in Ireland.

Swine.			Goats.	Horses.				Mules or Jennets	Asses.	Total Animals	Irish Ports.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	—	—	—	—	—	1	Ballina.
—	—	—	—	6	66	93	165	—	3	4,782	Belfast.
—	—	—	—	—	—	—	—	—	—	—	Coleraine.
—	2	2	—	54	100	106	260	—	—	267	Cork.
—	—	—	—	—	—	—	—	—	—	—	Drogheda.
—	1	1	5	110	276	79	465	1	—	2,628	Dublin.
—	—	—	—	—	5	4	9	—	—	9	Dundalk.
—	—	—	—	6	115	113	234	2	1	238	Greenore.
—	—	—	—	5	21	23	49	—	—	299	Larne.
—	—	—	—	—	—	—	—	—	—	—	Limerick.
—	—	—	—	—	12	3	15	—	—	787	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Milford.
—	—	—	—	—	—	—	—	—	—	—	Mulroy.
—	—	—	—	—	1	—	1	—	—	1	Newry.
—	—	—	—	—	—	—	—	—	—	—	Portrush.
—	—	—	—	—	2	1	3	—	—	24	Sligo,
—	—	—	1	1	175	179	355	—	—	431	Waterford.
—	—	—	—	—	—	—	—	—	—	2	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
—	3	3	6	182	773	601	1,556	3	4	9,469	Total.

IV.

Britain during the Three Months ended 31st December, 1914, showing in Great Britain.

Swine.			Goats.	Horses.				Mules or Jennets	Asses.	Total Animals	British Ports.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	2	10	17	29	—	—	1,754	Ardrossan.
—	—	—	—	1	31	40	72	—	—	2,877	Ayr.
—	—	—	—	—	—	—	—	—	—	—	Barrow.
—	1	1	—	—	8	12	20	—	—	21	Bristol.
—	—	—	—	—	—	—	—	—	—	—	Cardiff.
—	—	—	—	—	—	—	—	—	—	3	Falmouth.
—	—	—	1	15	143	146	304	—	—	318	Fishguard.
—	—	—	—	2	10	18	30	—	2	32	Fleetwood.
—	1	1	—	3	114	48	165	—	—	2,909	Glasgow.
—	—	—	—	1	—	—	1	—	—	296	Greenock.
—	—	—	—	—	1	4	5	—	—	5	Heysham.
—	1	1	5	77	256	156	489	3	1	504	Holyhead.
—	—	—	—	—	10	10	20	—	—	32	Liverpool.
—	—	—	—	—	—	—	—	—	1	1	London.
—	—	—	—	—	—	1	1	—	—	1	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	—	—	—	40	116	121	277	—	—	277	Plymouth.
—	—	—	—	—	—	—	—	—	—	—	Preston.
—	—	—	—	36	52	5	93	—	—	163	Silloth.
—	—	—	—	—	—	—	—	—	—	—	Southampton.
—	—	—	—	5	21	23	49	—	—	275	Stranraer.
—	—	—	—	—	1	—	1	—	—	1	Swansea.
—	3	3	6	182	773	601	1,556	3	4	9,469	Total.

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the
showing the PORTS of

IRISH PORTS.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	32	—	—	32	—	—	—
DUBLIN, .	207	10	—	20	237	41	—	41
TOTAL, .	207	42	—	20	269	41	—	41

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the
showing the PORTS of DEBARKATION

ISLE OF MAN PORT.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	207	42	—	20	269	41	—	41

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the
showing the PORTS of

IRISH PORTS.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	—	—	—	—	—	—	—
DUBLIN, .	—	—	—	—	—	—	—	—
TOTAL, .	—	—	—	—	—	—	—	—

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the
showing the PORTS of EMBARKATION

ISLE OF MAN PORT.	CATTLE					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	—	—	—	—	—	—	—	—

Isle of Man during the Three Months ended 31st December, 1914, Embarkation in Ireland.

Swine.			Goats	Horses.				Mules or Jennets.	Asses.	Total Animals.	Irish Ports.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	—	—	—	—	32	Belfast.
—	—	—	—	—	—	—	—	—	—	278	Dublin.
—	—	—	—	—	—	—	—	—	—	310	Total

Isle of Man during the Three Months ended 31st December, 1914, in the Isle of Man.

Swine.			Goats.	Horses.				Mules or Jennets.	Asses.	Total Animals.	Isle of Man Port.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	—	—	—	—	310	Douglas.

Isle of Man during the Three Months ended 31st December, 1914, Debarkation in Ireland.

Swine.			Goats.	Horses.				Mules or Jennets.	Asses.	Total Animals.	Irish Ports.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	1	1	—	—	1	Belfast.
—	—	—	—	—	3	3	6	—	—	6	Dublin.
—	—	—	—	—	3	4	7	—	—	7	Total.

Isle of Man during the Three Months ended 31st December, 1914, in the Isle of Man.

Swine.			Goats.	Horses.				Mules or Jennets.	Asses.	Total Animals.	Isle of Man Port.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	3	4	7	—	—	7	Douglas.

RETURN OF THE NUMBER OF ANIMALS SHIPPED to and from Places in the Places of Embarkation

Irish Ports.	Cattle.					Sheep.			Swine.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs	Total.	Fat.	Stores.	Total.
Cork to Aghada Pier, .	—	—	—	—	—	—	—	—	—	—	—
" to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
" to Spike Island, .	—	—	—	—	—	—	—	—	—	—	—
" to Queenstown, .	—	—	—	—	—	—	—	—	—	—	—
" to Waterford, .	—	7	—	6	13	—	—	—	—	—	—
Total, . .	—	7	—	6	13	—	—	—	—	—	—
Aghada Pier to Cork, .	—	—	—	—	—	—	—	—	—	—	—
Belfast " .	—	—	—	—	—	—	—	—	—	—	—
Spike Island " .	—	—	—	—	—	—	—	—	—	—	—
Queenstown " .	—	—	—	—	—	—	—	—	—	—	—
Waterford " .	—	—	—	—	—	3	—	3	—	—	—
Total, . .	—	—	—	—	—	3	—	3	—	—	—
Waterford to Ballyhack,	—	34	—	—	34	—	—	—	—	8	8
" to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
" to Duncannon	—	30	—	34	64	—	—	—	—	5	5
Total, . .	—	64	—	34	98	—	—	—	—	13	13
Ballyhack to Waterford,	40	6	—	—	46	25	—	25	96	—	96
Dublin to Belfast, .	707	—	—	—	707	567	—	567	—	—	—
Duncannon to Waterford,	161	14	—	—	175	6	—	6	194	—	194
Kilrush to Limerick, .	—	66	—	—	66	6	—	6	628	—	628
Kildysart " .	—	—	—	—	—	—	—	—	—	—	—
Glin, " .	—	—	—	—	—	—	—	—	—	—	—
Portumna, " .	—	—	—	—	—	—	—	—	—	—	—
Tarbert, " .	—	—	—	—	—	—	—	—	—	—	—
Kilkee, " .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	—	66	—	—	66	6	—	6	628	—	628
Milford to Portrush,	—	—	—	—	—	—	—	—	—	—	—
Belfast to Dublin, .	—	1	—	8	9	263	—	263	—	—	—
Londonderry to Mulroy,	—	—	—	—	—	—	—	—	—	1	1
Moville to Londonderry,	—	—	—	—	—	—	—	—	—	—	—
Ballina to Sligo, . .	—	—	—	—	—	—	—	—	—	—	—
Belmullet " . .	58	—	—	—	58	—	—	—	1,311	—	1,311
Westport " . .	—	—	—	—	—	—	—	—	—	—	—
Total, .	58	—	—	—	58	—	—	—	1,311	—	1,311
Sligo to Ballina, . .	—	2	—	—	2	—	—	—	—	—	—
Milford to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy to Milford, .	—	—	—	—	—	—	—	—	—	—	—
Dublin to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Leitbeg to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	966	160	—	48	1,174	870	—	870	2,229	14	2,243

INLAND NAVIGATION.

Ireland during the Three Months ended 31st December, 1914, showing and Debarkation.

Goats.	Horses. Stallions.	Mares.	Geldings.	Total.	Mules or Jennets.	Asses.	Total Animals.	Irish Ports.
—	—	—	—	—	—	—	—	Cork to Aghada Pier.
—	—	—	—	—	—	—	—	„ to Belfast.
—	—	—	—	—	—	—	—	„ to Spike Island.
—	—	—	—	—	—	—	—	„ to Queenstown.
—	—	—	—	—	—	—	13	„ to Waterford.
—	—	—	—	—	—	—	13	Total.
—	—	—	—	—	—	—	—	Aghada Pier to Cork.
—	—	—	—	—	—	—	—	Belfast „
—	—	—	—	—	—	—	—	Spike Island „
—	—	—	—	—	—	—	—	Queenstown „
—	—	—	—	—	—	—	3	Waterford „
—	—	—	—	—	—	—	3	Total.
—	—	2	—	2	—	—	44	Waterford to Ballyhack.
—	—	2	2	4	—	—	4	„ to Belfast.
—	—	2	2	4	1	—	74	„ to Duncannon.
—	—	6	4	10	1	—	122	Total.
—	—	—	—	—	—	—	167	Ballyhack to Waterford.
—	—	—	—	—	—	—	1,274	Dublin to Belfast.
—	—	—	—	—	—	—	375	Duncannon to Waterford.
—	—	—	3	3	—	—	703	Kilrush to Limerick.
—	—	—	—	—	—	—	—	Kildysart „
—	—	—	—	—	—	—	—	Glin „
—	—	—	—	—	—	—	—	Portumna „
—	—	—	—	—	—	—	—	Tarbert „
—	—	—	—	—	—	—	—	Kilkee „
—	—	—	3	3	—	—	703	Total.
—	—	—	—	—	—	—	—	Milford to Portrush.
—	—	—	—	—	—	—	272	Belfast to Dublin.
—	—	—	—	—	—	—	1	Londonderry to Mulroy
—	—	—	—	—	—	—	—	Moville to Londonderry.
—	—	—	—	—	—	—	—	Ballina to Sligo.
—	—	—	—	—	—	—	1,369	Belmullet „
—	—	—	—	—	—	—	—	Westport „
—	—	—	—	—	—	—	1,369	Total.
—	—	—	—	—	—	—	2	Sligo to Ballina
—	—	—	—	—	—	—	—	Milford to Mulroy.
—	—	—	—	—	—	—	—	Mulroy to Milford.
—	—	—	—	—	—	—	—	Dublin to Waterford.
—	—	—	—	—	—	—	—	Leitbeg to Mulroy.
—	—	6	7	13	1	—	4,301	Total

RETURN of the NUMBER of HORSES EXPORTED from IRELAND through GREAT BRITAIN to the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 31ST DECEMBER, 1914, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, ...	—	—	—	—
Cork, ...	—	—	—	—
Dublin, ...	—	11	—	11
Dundalk, ...	—	—	—	—
Greenore, ...	—	—	—	—
Waterford, . . .	—	—	—	—
Wexford, ...	—	—	—	—
Total, . . .	—	11	—	11

RETURN of the NUMBER of HORSES IMPORTED into IRELAND through GREAT BRITAIN from the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 31ST DECEMBER, 1914, showing the Ports of Debarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, ...	—	18	27	45
Dublin, ...	35	52	2	89
Total, . . .	35	70	29	134

RETURN of the NUMBER of HORSES EXPORTED from IRELAND direct to FOREIGN COUNTRIES during the THREE MONTHS ended 31ST DECEMBER, 1914, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Cork, ...	—	—	—	—
Limerick, ...	—	—	—	—
Total, . . .	—	—	—	—

DISEASES OF ANIMALS IN IRELAND.

NUMBER OF OUTBREAKS of SWINE FEVER, and NUMBER of SWINE returned as having been SLAUGHTERED in Ireland, under the Diseases of Animals Act of 1894, in the undermentioned period, by Order of the Department.

Quarter ended	Swine Fever.	
	Outbreaks confirmed.	Swine Slaughtered as Diseased or as having been Exposed to Infection.
31st December, 1914, ...	32	127

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been Attacked by ANTHRAX, GLANDERS and FOOT AND MOUTH DISEASE in Ireland in the undermentioned period.

Quarter ended	Anthrax.		Glanders (including Farcy).		Foot and Mouth Disease	
	Outbreaks Reported	Animals Attacked.	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.
31st Dec., 1914,	—	—	—	—	—	—

NUMBER of CASES of RABIES in DOGS in IRELAND during the undermentioned period.

Quarter ended	Number of Cases.
31st December, 1914, ...	—

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been attacked by SHEEP-SCAB and PARASITIC-MANGE in Ireland in the undermentioned period.

Quarter ended	Sheep-Scab.		Parasitic-Mange.	
	Outbreaks Reported.	Sheep Attacked.	Outbreaks Reported.	Animals Attacked.
31st Dec., 1914,	91	551	8	13

Veterinary Branch,
Department of Agriculture and Technical Instruction
for Ireland, Dublin.

ACCOUNT showing the QUANTITIES of certain kinds of AGRICULTURAL
into Ireland during each WEEK

ARTICLES	WEEK ENDED 3rd October	10th October	17th October	24th October	31st October
ANIMALS LIVING—					
Horses . . . . . No.	—	—	—	—	—
FRESH MEAT—					
Beef (including refrigerated and frozen), ... cwts.	—	—	—	—	—
Mutton, „ „ „ „	—	—	—	—	—
Pork, „ „ „ „	—	—	—	—	—
Unenumerated, „ „ „	—	—	—	—	—
SALTED OR PRESERVED MEAT—					
Bacon, ... cwts.	—	—	—	—	—
Beef, ... „	—	—	—	—	—
Hams, ... „	—	—	—	—	—
Pork, ... „	—	—	—	—	—
Meat, unenumerated, Salted „	—	—	—	—	—
Meat, preserved otherwise than by salting (including tinned and canned), ... cwts.	—	—	—	—	—
DAIRY PRODUCE AND SUBSTITUTES—					
Butter, ... cwts.	—	—	—	—	—
Margarine, ... „	22	223	226	158	—
Cheese, ... „	—	—	—	—	—
Milk, Condensed, . . . „	59	6	66	84	18
„ Cream, ... „	—	—	—	—	—
„ Preserved, other kinds „	—	—	—	—	—
EGGS, ... gt. hunds.	—	—	—	—	—
LARD, ... cwts.	—	81	—	—	—
CORN, GRAIN, MEAL AND FLOUR—					
Wheat, ... cwts.	67,800	79,500	51,500	38,600	96,200
Wheat, Meal and Flour, . . „	—	36,000	11,500	60,200	23,600
Barley, ... „	—	—	—	—	19,100
Oats, ... „	—	—	—	—	—
Peas, ... „	—	—	—	—	—
Beans, ... „	—	—	—	—	—
Maize, or Indian Corn, . . „	261,600	180,400	384,600	205,800	194,100
FRUIT, RAW—					
Apples, ... „	—	—	—	—	—
Currants, ... „	—	—	—	—	—
Gooseberries, ... „	—	—	—	—	—
Pears, ... „	—	—	—	—	—
Plums, ... „	—	—	—	—	—
Grapes, ... „	—	—	—	—	—
Lemons, ... „	—	—	—	—	—
Oranges, ... „	—	—	—	—	—
Strawberries, ... „	—	—	—	—	—
Unenumerated, ... „	—	—	—	—	—
HAY, ... tons,	—	—	—	—	—
STRAW, ... „	—	—	—	—	—
MOSS LITTER, ... „	—	52	79	30	—
HOPS, ... cwts.	—	—	—	—	—
VEGETABLES, RAW—					
Onions, ... bushels,	130	1,240	1,642	—	—
Potatoes, ... cwts.	—	—	—	—	—
Tomatoes, ... „	—	—	—	—	—
Unenumerated, . . . value £	8	—	—	—	—
VEGETABLES, DRIED, . . . cwts.	—	—	—	—	—
Preserved by Canning, . . „	—	—	—	—	—
POULTRY AND GAME, . . value £	—	—	—	—	—

*This Table is confined to the Imports of certain kinds of Agricultural Produce into
to a request from this Department kindly consented to separate the Irish Imports (direct)
form of Weekly Returns.

Produce imported direct (i.e., from the Colonies or Foreign Countries) of October, November, and December, 1914.*

Week Ended							
7th November	14th November	21st November	28th November	5th December	12th December	19th December	26th December
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
143	100	50	—	96	397	101	12
—	—	—	77	452	—	1,376	—
55	133	32	—	—	132	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
199,500	—	273,700	360,100	191,900	261,400	257,500	70,700
—	—	17,500	75,200	36,300	—	53,200	—
—	—	—	—	—	—	34,100	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
188,800	275,900	463,700	339,300	109,500	422,800	201,500	305,600
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
12	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
660	1,120	1,540	—	2,160	1,220	—	120
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	7	—	—	4	6	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—

Ireland from the Colonies and Foreign Countries. The Board of Customs have in answer from those of the United Kingdom, and to supply this Department with them in the

Statistics and Intelligence Branch,
Department of Agriculture
and Technical Instruction for Ireland.

EMIGRATION FROM IRELAND.

TABLE showing, by Destinations, the Numbers of Emigrants (Natives of Ireland) who left the Ports of Ireland during the Months of October, November, and December, 1914, and the total for the Twelve Months ended the 31st December, 1914, together with the total Number of Emigrants in each of the corresponding periods of the year, 1913.

DESTINATION.	October, 1914.	November, 1914.	December, 1914.	Twelve Months ended 31st December, 1914.
FOREIGN COUNTRIES AND THE COLONIES :—				
America (U.S.), .	2,105	457	101	15,272
Canada, . . .	66	49	26	2,909
South Africa, . . .	7	—	2	118
Australia, . .	60	31	52	768
New Zealand, . .	15	20	2	172
Other Countries, .	4	2	—	28
Total, . .	2,257	559	183	19,267
GREAT BRITAIN :—				
England and Wales, .	61	96	73	914
Scotland, . . .	13	15	—	133
Total, . . .	74	111	73	1,047
General Total, 1914,	2,331	670	256	20,314
General Total, 1913,	2,979	1,151	431	30,967

The figures in the above Table have been abstracted from the monthly Return published by the Registrar-General for Ireland.

The figures are subject to revision in the Annual Report.

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Vol. XV. **No. 3.**

DEPARTMENT OF AGRICULTURE

AND

TECHNICAL INSTRUCTION FOR IRELAND.

JOURNAL.

Ireland's Industrial Opportunities—Investigations on Potato Diseases —Tobacco Growing in Ireland — Cultivation of Seaweed in Ireland—Composition of Grain, Flour, and Milling Offals of Wheat—Flax Experiments, 1913—Third Irish Egg-Laying Competition—Farriery Instruction in Ireland—Winter Egg Records—Official Documents—Notes and Memoranda—Statistical Tables.

FIFTEENTH YEAR

No. 3

APRIL, 1915.

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1915.

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CONTENTS.

NOTICE.

Communications respecting the literary contents of this JOURNAL *should be addressed to the Superintendent of the Statistics and Intelligence Branch, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin.*

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IRELAND'S INDUSTRIAL OPPORTUNITIES.

[*A Lecture delivered before the Insurance Institute of Ireland on Tuesday, April 20th,* 1915, *by* GEORGE FLETCHER, M.R.I.A., *Assistant-Secretary in respect of Technical Instruction.*]

The industrial development of Ireland, always a vitally important question, is a matter of particular interest and urgency at the present juncture, when the commercial relationship of all civilised countries are disturbed or even dislocated by the War. When the nations are again at peace the bloodless but relentless and never-ending war of commercial and industrial competition will be more strenuous than ever, but it is impossible to suppose that the conditions under which it must be waged will be the same as before. The nature of the changes cannot be foreseen with any certitude, but economic principles will continue to operate and it is not impossible to estimate some of their probable effects under the changed conditions. However rapidly reparative forces may operate after the War, it seems to us here to-night very unlikely that the too-familiar legends "Made in Germany" or "Made in Austria" will commend the goods bearing them to consumers in these islands for a very long time to come. It is, doubtless, equally true that many branches of British trade will be seriously dislocated by the loss of German markets, but this is a less serious matter.

TRADE BETWEEN THE UNITED KINGDOM AND GERMANY.

Let us for a moment glance at the volume of trade between the United Kingdom and Germany. In 1912 the imports into the United Kingdom of manufactures from Germany amounted to some 49 million pounds. The corresponding exports from the United Kingdom to Germany were about 30 million pounds—a difference of 19 millions. The export of German manufactures to the Overseas Dominions and foreign countries outside Europe amounted to over 80 millions.

THE EFFECTS OF THE WAR ON COMMERCE NOW.

The industries of the United Kingdom have doubtless suffered considerable disturbance as a result of the War, but it is certain that Germany has suffered in an enormously greater degree owing mainly to the removal from the seas of Germany's shipping and the cutting-off of supplies by neutrals. Some 40 per cent. of Germany's total export trade was to countries now at war with her and other sources of supply are now being developed. She is suffering acutely by the stoppage of the supplies of raw materials. Take only the case

of the woollen industry. Professor Ashley, a well-known authority, in a paper on "The Economic Position of Germany," read before the Royal Society of Arts in February last (*Journal R.S.A.*, Vol. LXIII. p. 308), deals with this question. "With the improvement in German agricultural methods," he remarks, "the number of sheep kept in the country has been rapidly dwindling. In 1900 it was nearly 10 millions, in 1912 it was under 6 millions; for comparison, it may be added that in England and Wales alone in that year it was over 18 millions." I may add that in the same year the number of sheep in Ireland was nearly 4 millions. Germany's woollen trade depends largely, therefore, on imported wool, two-thirds of which came from countries now hostile—most of it from Australia and the Cape.

THE EFFECTS OF THE WAR ON COMMERCE AFTER THE WAR.

It is common knowledge that the facts to which I have referred, together with the demand created by the necessity of equipping a new and an enormous army, have resulted in a great stimulation of certain of our industries, but we shall be wise if we look beyond this temporary phase and keep steadily in view the conditions likely to be encountered after the War. A far smaller disturbance than that caused by the War would be sufficient to destroy the commercial balance and, however quickly Germany may recover, a great re-distribution of trade will be inevitable, an opening of new markets and a closing of old ones, a development of new sources of supply both for raw material and for manufactured goods. There will be a new outlook and new sympathies—it would, I believe, be a fatal mistake to suppose these have no place in commercial relationships—and those countries and communities who take "the long view," who adventure wisely, who adopt scientific methods, and who, taught by past failures and successes of themselves and others, act swiftly and vigorously, will, to borrow a word from military writers, secure "the initiative" in industry. It is scarcely necessary to say here that, industrially and commercially, the interests of Ireland are intimately bound up with those of Great Britain, which is by far our greatest market, and what concerns one country concerns the other. Happily, there is no fear that this concern can ever again take the shape it did at the end of the seventeenth century, when, as a result of legislative action, the Irish woollen industry was restricted and almost destroyed, while, by similar means, the linen industry was encouraged. It is essential, however, to bear in mind the changes effected by the growth of means of rapid transit by land and sea, by which means Irish industries are closely affected by industrial changes even in the Antipodes.

If it be admitted that the present state of Europe will afford

increased opportunities for British industry we may be permitted to inquire whether it is likely that Britain will be able to profit by these opportunities. There are those who believe that Britain is decadent. The fact that British trade is, as a whole, extremely prosperous is discounted by the enormous growth of German industries. But it must be remembered that such a growth was natural and inevitable, and that trading with a foreign country involves exchange—that imports from are a corollary to exports to such a country. The fear that we should "lose the initiative" was natural enough, the truth being that British industry had so flourished that manufacturers gained their money too easily and failed to perceive the real cause of their prosperity. The German, it is true, has shown extraordinary business acumen in applying to his industries the results of scientific discoveries in these islands, discoveries which we have failed to assess at their proper value or to apply to our own industrial and commercial advantage. Our industrialists have not always looked sympathetically upon our scientific men, and have remained oblivious of their epoch-making discoveries which have too often remained buried in the transactions of our learned Societies, except when the German has utilised them for the production of wealth. Was it not an Englishman—Thomas—who invented the basic process by means of which Germany was enabled to use her huge stores of phosphoric ore in Luxemburg and Lorraine? and was it not Dr. Perkin who made the discoveries by which alone the aniline dye industry was made possible? Such examples might be indefinitely multiplied, and one of the good things which will emerge from this welter is that scientific men will come by their own.

IRELAND'S OPPORTUNITIES.

And if the present state of things offers opportunity to British industries, how does Ireland stand? Does she stand to profit? The question cannot be dealt with lightly or "off-hand." My own sad experience on many occasions when such a question arises is to be met by the statement that "Ireland is an Agricultural Country." The statement is so trite that it would be superfluous were it not that the well-known phrase is used to imply more than it states. As commonly used it implies not only that Ireland is an agricultural country, but also that it is not an industrial country. This involves so damaging a notion that it is necessary to examine it carefully. It will surprise many people to learn that as many people are engaged in industrial and commercial pursuits in Ireland as are engaged in agriculture, and that while those engaged in agriculture decreased in the decennium preceding the last census by nearly a hundred thousand those engaged in industrial work alone decreased only by twenty-six thousand.

THE NEED FOR INDUSTRIES.

It is not yet fully realised that for a healthy country-side one must have a healthy town—a town to create a market for farm products and to provide employment for those who cannot be profitably employed on the land. I have prepared a diagram shewing in graphical form the principal points of relationship between the population of Ireland and its agriculture. It will be seen that within a few years of the famine the population of Ireland was double the number of cattle. By 1895 the numbers were about equal. In 1911 we find some hundreds of thousands more cattle than people, while the land under cultivation has diminished by about one-half since 1851. Broadly speaking, the population diminishes at the same rate as the land goes out of cultivation. As for the cattle it may be said that they vary inversely as the population. An ox the more, a man the less. If it be true to say that Ireland is an agricultural country to-day—I express no opinion on the point, though I think the phrase misleading—it is correct to say that if the present tendency persists it will soon cease to be agricultural in the true sense of the word. All that a beneficent Department has been able to do has not very materially checked the decline in tillage. It would be an interesting inquiry how far this decline in tillage is due to the absence of industrial towns and whether the effort should not be to model ourselves on Belgium—on Belgium as she was nine months ago—a country with an area about a third that of Ireland, a population nearly twice as great—a population density nearly five times as great.

BELGIUM!

Belgium was, and we shall hope will soon be again, a country of intensive culture and keen industrialism—industrialism of a kind we desire to see here. Though it has a number of large industries it is essentially a country of small industries. It is significant moreover, that, with its dense population (655 to the square mile) there was in Belgium a decennial increase of about 10 per cent. It seems quite certain that the only way to stem the tide of emigration from Ireland is either by employing the people in the cultivation of the land or in industries. I am mainly concerned with the latter problem which, difficult though it is, seems simple as compared with the former.

THE QUESTION OF RAW MATERIALS.

It is necessary at once to deal with an objection frequently raised against the view that Ireland may become great industrially—the

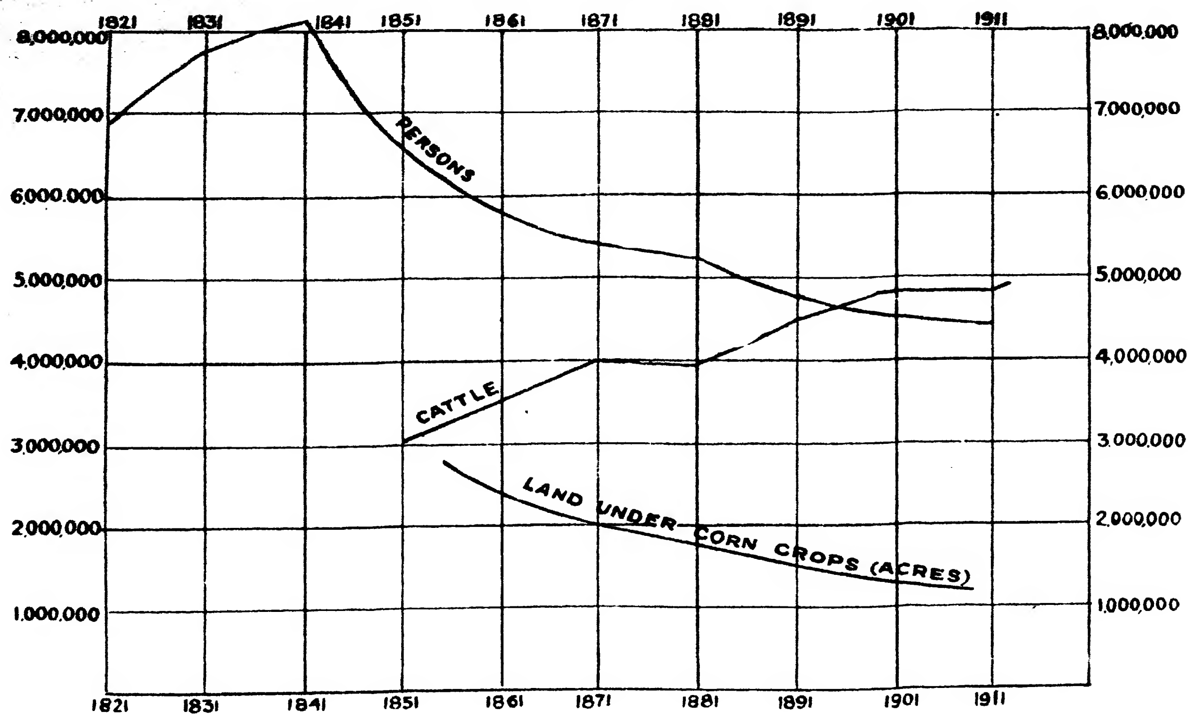


Diagram 1.—Showing the fall in population, the increase in cattle production, and the decline in area under corn crops.

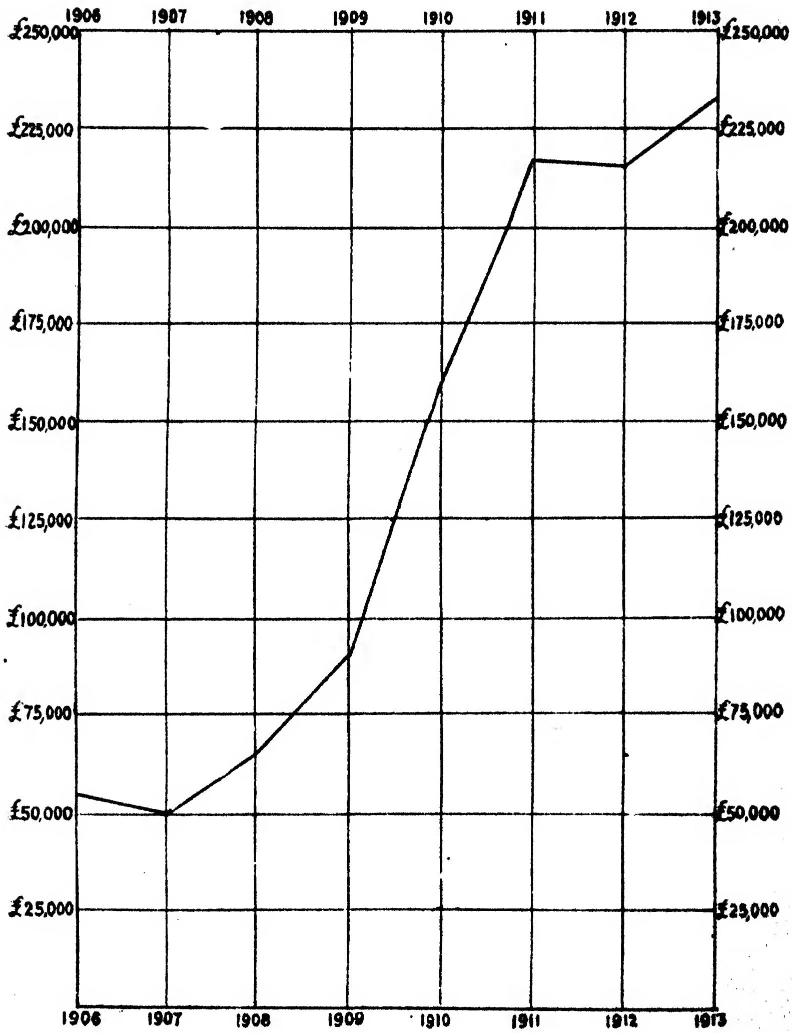


Diagram 2.—Showing the estimated value of the Exports of Alumina during the period 1906-1913.

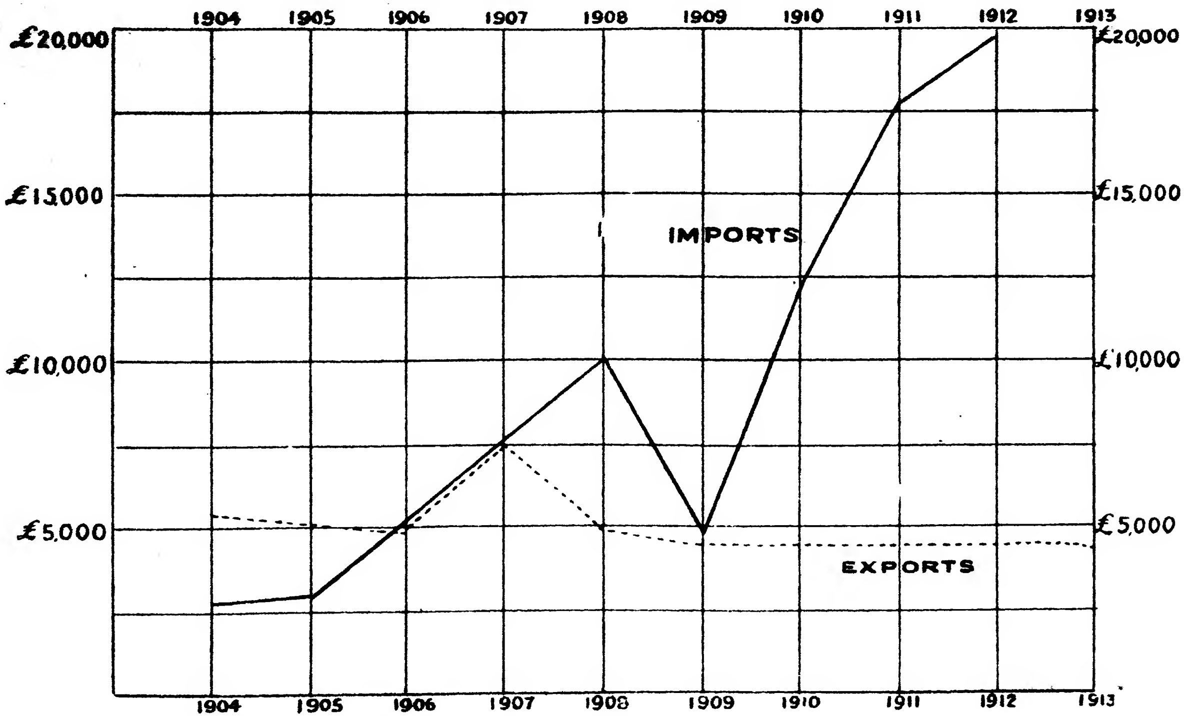


Diagram 3.—Showing the estimated value of the Imports and Exports of Bauxite during the period 1904–1913.

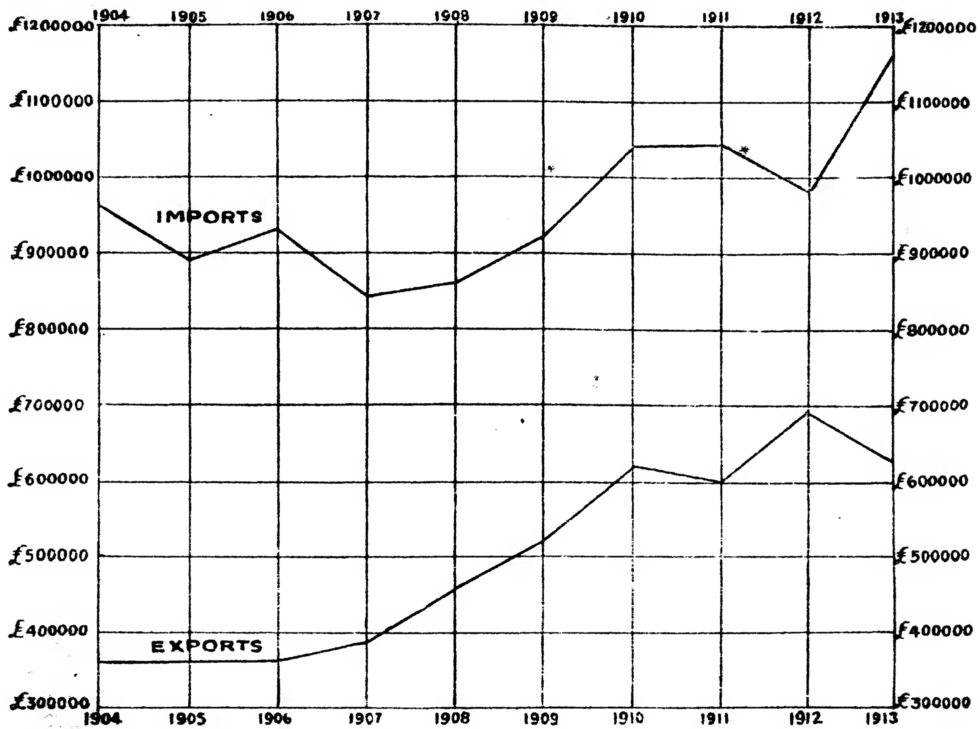


Diagram 4.—**Showing the value of Imports and Exports of Woollen Goods during the period 1904-1913.**

objection that Ireland is practically without coal and iron and lacks certain other raw materials. The objection is academic. I might quote the extraordinary progress and present state of the linen industry—or consider the statistics relating to the development of the shipbuilding industry of Ireland—of Belfast—in spite of these supposed disadvantages. Or look at these diagrams illustrating the imports and exports of a mineral known as bauxite and the exports of a substance known as alumina. The question here is simple, for there is only one place in Ireland where the preparation of alumina is carried on. Alumina (oxide of aluminium) is, as you know, the substance from which the metal aluminium is extracted by electrolytic action. The alumina is prepared from the mineral bauxite, and the works at Larne were established to utilise the deposits of this mineral which occur near Ballintoy. In the course of time, however, the mineral of this deposit proved unsuitable, and it was necessary to import it from the South of France, but this fact did not disturb the industry, which, extending its works, imported raw material from a foreign country from which it prepared an intermediate product with the help of coal imported from Scotland, which intermediate product was exported to the Fall of Foyers to have the aluminium extracted. The cost of labour is a partial explanation of this phenomenon, but it must be admitted that *inertia* has much to do with the location of any industry, and it is this which renders the establishment of a new industry so difficult a matter.

NEW INDUSTRIES AND "INERTIA."

Once an industry becomes established in a district it is difficult to dislodge it—it is 'indigenous,' and any new district essaying to establish a rival to it has a difficult task before it. When an industry becomes established in a place there is gradually formed an environment—a kind of atmosphere—favourable to its growth. This atmosphere cannot be hastily produced, nor can it be transferred. I do not seek to deprecate attempts to start new industries, but it is well that we should frankly face the difficulties. Taking full account of these difficulties, however, it yet appears that an opportunity is at hand for starting new industries, and also for the further development of those now in existence.

RECENT INDUSTRIAL PROGRESS.

An examination of the industrial progress of Ireland during the last decade also affords material for real encouragement. The reports on the trade in Imports and Exports issued by the Department are full of interesting if sometimes perplexing reading.

Nothing would be easier than to draw unwarrantable conclusions from the statistics they contain, which require careful analysis.

WOOLLEN MANUFACTURES.

I have, however, arranged diagrams to shew the increase in trade in Woollen Manufactures, since 1904. You will note that our exports of Woollen goods have nearly doubled since 1904. It would be quite a mistake, however, to conclude that the industry employs twice as many workers. As a matter of fact census figures seem to render it improbable that there has been any increase at all. The explanation is probably to be found in an increase of prices and in the change in manufacture, in the decrease of hand-weavers and the increased productivity of machinery. It is a regrettable fact that just as the change from tillage to cattle-rearing displaces human labour so does the change from the simpler methods of production to the employment of machinery. Happily, however, with this difference: the displacement due to the introduction of machinery is temporary and is followed by increased employment. In many branches of industry there has been an increase of trade and of prosperity. It is not uncommon to quote in support of this view of an increase of prosperity, the large increase in the amount of deposits in Joint Stock Banks—the amount in 1913 was over sixty-two million pounds—and in the Post Office Savings Bank, but it is much to be desired that more of this should be invested in Irish Industrial development—invested with a view to profits. The assistance of the man who is willing to put a few hundreds into Irish industry and is "prepared to lose it" is, because of the spirit of detachment, of doubtful value. What is wanted is the investments of those who look for a reasonable return and will use every effort to secure such a return.

HOME AND COTTAGE INDUSTRIES.

Since the establishment of the Department of Agriculture and Technical Instruction strenuous efforts have been made—not unsuccessfully—to encourage home and cottage industries. The lace industry, for example, has yielded a useful supplement to the family income in many a rural home. The number of persons employed in this industry increased from 2,099 in 1901 to 3,004 in 1911, and while every effort should be made to conserve and develop such industries the tendency is for the work to pass, sooner or later, into the factory, and this fact raises an important consideration.

IRELAND UNSUITED TO LARGE FACTORY INDUSTRIES.

Again and again I have heard it said that Ireland is unsuited to large factory industries, and that it would be undesirable,

even if it were possible, for Ireland to develop into a Lancashire or a Yorkshire. It is impossible not to have a good deal of sympathy with this attitude, but I have frequently urged the view that, given suitable organisation small factory industries would succeed in Ireland. I should like to quote from a paper read by me before the Thirteenth Annual Congress of the Technical Instruction Association on " The Problem of Small Industries," which bears closely on this point :—

IRELAND SUITED TO SMALL FACTORY INDUSTRIES.

" A number of conditions, physical, geographical and social, point to the fact that the larger portion of Ireland is unsuited to the introduction of large, highly-organised industries, such as characterise the North of England and the North-east of Ireland. I shall not elaborate this statement. I venture to express the opinion, however, that there is a great promise of success in the development of small, well-organised industries, suited to local conditions. Their establishment is as vital to the existence of agriculture as it is essential to the prosperity of the smaller towns of the country. Let us consider briefly the economics of such a class of industry as I refer to. We must at once dismiss as fallacious the notion that the availability of an old mill building, or the neighbourhood of a waterfall, are anything more than subordinate considerations. Much harm has been done by raising false hopes on the unsubstantial view that Ireland might build up industries on her water-power. There was never a greater fallacy. A comparison of the wages bill and the power bill of almost any Irish industry will dispose of the question.

" The principal factors to consider are :—

" (1) The cost of labour;

" (2) the cost of raw material;

" (3) the neighbourhood of markets and cost of transport;

" (4) the cost of motive power;

" (5) rents, etc.

" The relative importance of these factors differs in different industries. The order in which they are set down here will represent their relative importance in many industries. They do not represent all the factors, and the incidence of those mentioned requires careful study in the case of any industry. The cost of labour is, in most industries, a predominant factor, and one that will determine —is, indeed, determining—the decentralisation of industries. The higher cost of living in cities necessitates higher wages. The workman in the smaller towns can, with lower wages, secure greater

comfort. The difference between the rates of wages will, in many cases, be sufficient to turn the balance in favour of the small town. A further consideration of great importance to us arises here. The value of labour cannot be measured by the rate of wages alone. Low wages do not imply cheap labour."

THE MACHINE EMBROIDERY INDUSTRY.

Let me give one instance of the introduction of a new industry which is of peculiar interest. Closely associated with the linen weaving industry of Ulster is the hand-embroidery of linen. This industry is essentially a home industry; it is carried on by women and girls, and yields something like a quarter of a million pounds per annum in wages. But in time past it was considerably larger. For the last twenty years it has declined, both as to the number of persons employed and the prices paid for work. The explanation is that manufacturers were getting their linen embroidered abroad. Huge quantities of handkerchiefs were sent to Switzerland, to be embroidered on machines introduced no less than fifty years ago. The machines underwent important improvements, and for the last quarter of a century some of our Irish linen manufacturers have had factories in St. Gall. A full inquiry into the conditions was instituted by the Department, who sent their Inspector of Industries to make a report. In the end, the Department undertook to aid in the maintenance of two schools of Machine Embroidery, and for five years one has been in successful operation at Ballydougan, in Co. Down; and more recently one has been established at Maghera, in Co. Londonderry.

These schools are well designed, light and airy buildings, offering pleasant conditions for work. No motive power is required other than that provided by the worker. The worker sits at one end of the machine, which is operated by hand and foot. The enlarged design is mounted on a board, and the operator follows it, point by point, with an indicator which operates a pantograph and moves the long frame holder containing the handkerchiefs, which are held in position by metal frames. In the six and three-quarter yards machine as many as 234 handkerchiefs are embroidered simultaneously. The needles, pointed at either end, with an eye in the middle, are held by clips in a frame which moves to and fro on wheels. The 234 needles pass through the handkerchiefs at the precise points required, and are seized by corresponding clips at the other side, which slide back, pulling taut the threads. The operator moves the pantograph indicator to the next point of the design, and, by the movement of a lever, the frames containing the needle clips repeat the operation. The needles are threaded and the thread knotted and cut automatically by a beautiful and cunningly-devised

machine. *[The Schools, and mode of working of the machines, were illustrated by lantern slides and by a cinematograyh film.]*

These schools have been very successful. Before they were started there were scarcely a dozen of these machines in Ulster. Now there are, I am informed, something like 140, and we are well on the way to capture the industry, and thus provide employment for our own workers.

INDUSTRIES SUITABLE AND UNSUITABLE FOR INTRODUCTION.

There are many industries which, at first sight, seem capable of introduction into Ireland, but which, on careful inquiry, are found to offer little promise of success. The manufacture of straw plait is one of these. This industry is carried on largely as a home industry in the Black Forest, where the industrious women foik are willing to work long hours for a few pence per day. The making of straw envelopes for bottles was at one time carried on near Dublin and is now carried on abroad, but it has ceased to be a hand industry, and as a machine industry it employs little labour.

Industries, moreover, are gregarious, and almost any industry of importance causes to grow up around it subordinate industries which in time become essential to the parent industry. The linen weaving industry is a good example, with its subordinate industries of embroidery, hem-stitching and so forth.

THE TRADE IN TOYS.

Now, before war broke out, Germany was sending us over a million pounds' worth of "Toys and Games" per annum. The export of such goods from the United Kingdom to Germany was of the value of £50,000. The cutting-off of the supply of nearly a million pounds' worth of toys was a serious menace to domestic peace—the nursery was in danger, and immediately men's and women's minds were turned to producing toys. Great skill and ingenuity have been shown in devising new and beautiful toys, but in such an industry considerable conservatism exists, and the consumers' tastes are not easily changed—the doll is firmly and permanently enthroned. But the manufacture in Great Britain of dolls—of dolls of the conventional type—on a commercial scale offers great difficulties. The doll's head, the china head, is a German product, and the task of producing it at a possible price in the United Kingdom proved an obstacle, if not insuperable, at all events formidable. A similar difficulty was experienced in regard to dolls' eyes, the manufacture of which is a distinct trade. These obstacles are of course being overcome, but they illustrate the difficulties which accompany the starting of a new industry. The present juncture offers an excellent opportunity for tackling them.

THE GLASS INDUSTRY.

Earnest efforts have been directed during the past few months to an attempt to establish or re-establish the glass industry in Ireland. Certainly there is an exceptional opening here. Before the War we were importing into the United Kingdom from Germany over a million pounds' worth of glass in excess of that we exported to it. We imported more than a million and a quarter pounds' worth from Belgium. Ireland, alone, imported more than £400,000 worth. Experiments made in the laboratories of the Royal College of Science with a view to testing the suitability of Irish sand, gave very encouraging results; these await verification by tests on a commercial scale.

EXISTING INDUSTRIES TO BE DEVELOPED.

But no matter what new industries may be launched in Ireland, great success awaits the development of existing ones. There is no reason why the woollen industry of Ireland should not be enormously increased and become as great an industry in the South as the linen industry has become in the North. All that is necessary is the wider application of those business qualities which have secured its successful development in recent years—and the adventuring of capital. The Lace and Embroidery industry is similarly capable of extension. Already the coloured embroidery, which was formerly imported from Austria, is being produced, the workers being trained in classes organised in connection with the Department. Germany's trade in lace and embroidery is of surprising dimensions, and her competition has seriously damaged the trade of the United Kingdom. Her exports of these goods in 1912 exceeded five million pounds in value, of which nearly a million and a half came to the United Kingdom. It is, of course, a factory industry, and it has its centre in Plauen. Nottingham has, for many years past, felt the full weight of the competition, and has suffered greatly in its trade. Both England and Ireland will, it is hoped, profit by the opportunity which now arises. A great opportunity arises for our leather trade. Germany exports to us over two million pounds worth of leather, and this entails important issues for Ireland. This question involves that of the dead meat trade, and is so large and vital that I dare not venture to deal with it in this paper.

SOME GENERAL PRINCIPLES.

I should like, in the short time that remains to me, to refer to some principles of a more general character, which I believe to be of fundamental importance. The trade opportunities to which I

have referred are exceptional, and if seized may result in enormous and lasting advantage to us, but we must not forget that, sooner or later, trade will resume a normal course, and economic influences will operate as before. But the War has brought home to a large number of people truths which a year ago found only unwilling hearers, and we have at last awakened to dangers of the existence of which we were scarcely aware.

GERMANY AND THE DYE INDUSTRY.

The Synthetic Dye industry is a case in point. For many years past we have used the German coal-tar dye industry as a warning, and have made it a ground of appeal for a more adequate recognition of the importance of science in regard to its application to industry. It is at once a matter for pride that the fundamental discoveries upon which the industry is based were made in England, and of reproach that England allowed the industry to pass into German hands. Six years after the discovery of mauve by Perkin in 1856, Hofmann, the famous German chemist, predicted the displacement of natural indigo, and the increase of England's wealth as a result of the development of the artificial dye industry. But, alas, the transfer of the industry to Germany began nearly half a century ago, and this fact must be attributed to Germany's belief in the value of scientific discovery, to the spirit of enterprise of her business men, and to their powers of organisation. It must be noted that this is not a "protected" industry, and that England had an abundance of raw material. We have, almost unmoved, watched the growth of this industry, which has for many years yielded dividends of between 20 and 30 per cent. Syndication in this as well as in other German industries has progressed to an extraordinary degree, and the principal artificial dye firms in Germany have established a "community of interests." A visit to one of the larger works is, indeed, a liberal education. Six years ago I had an opportunity of inspecting the Badische Anilin und Sodafabrik, at Ludwigshafen. An account of this would be beyond the scope of this paper, but I may observe that, at the time of my visit, this factory employed about 8,000 workpeople (for whose welfare and comfort excellent provision is made). They were employing nearly 200 trained chemists, mainly engaged in research, and, holding some 1,200 patents, are constantly adding to them and extending their operations in ever new directions.

The reasons for England's loss and Germany's gain of this industry have frequently been dealt with by British writers, but it is useful to learn the views of a German, especially when the writer is a man of high repute in the industrial world. In a volume called *Reflexionen*, published a few years ago, Dr. Walther Rathenau expresses the opinion that the reasons for the comparative dimi-

nution of England's industrial strength are that while the Englishman loves leisure, country life and sports, and enjoys work, he does not sacrifice himself to work. The German, he says, loves his work and is insatiable in his thirst for knowledge. The German, cautious though he be, avails himself of innovations without waiting for mathematical demonstrations of their value. The conservative Englishman, on the other hand, meets every innovation with the question, "Will it pay?" until his methods became antiquated. I will not stop to discuss the justice or injustice of this criticism, but no one with a first-hand knowledge of the educational systems of the two countries will doubt the truth of his criticism when, speaking of the chemical industry, he attributes German success and England's want of it to the fact that England has not the army of trained workers such as is annually recruited from the German high schools.

THE ANILINE DYE INDUSTRY.

The present position of the aniline dye industry is briefly this: We consume something like two million pounds worth of dyes per annum—of this one-tenth is produced in the country. These two million pounds' worth of dyes are essential to various industries, textile and other, worth £200,000,000 a year and on which 1,500,000 workmen are dependent. In 1913 we imported from Germany over one and a half million pounds worth of these dyes—mainly aniline and naphthalene. The danger of what almost amounts to a monopoly of the dye industry by Germany is immediately apparent, and is such that the Government took an unusual step. A Committee was formed and a scheme for establishing the industry framed, the Government to advance to the proposed Company £1,500,000 bearing interest at the rate of 4 per cent. per annum, repayable in twenty-five years. The scheme was much criticised, for many people feared that after the War it could not stand against the competition of German manufacture. Moreover, some of our leading chemists predicted failure because it was proposed not to include chemical experts on the directorate. It was urged that it has been the practice to associate chemists with the management of the German concerns. The scheme has been recast, and after many ups and downs it is now announced that the scheme will be proceeded with. It is fervently to be hoped that consumers will take the long and patriotic view. Should the scheme fail it will not be for the want of first-rate chemists capable of leading such an enterprise.

Fas est et ab Hoste Doceri.

From a careful comparison of methods and results as between

Germany and the United Kingdom certain principles emerge. Certain methods adopted in Germany have been urged as applicable in the United Kingdom, and while it is meet that we should be willing to learn even from our enemy, it must not be forgotten that methods cannot be adopted without such modification and adjustment as may be dictated by the character and capacities—in a word, by the *genius* of our people. I have not, in the course of this paper, mentioned education, except it be indirectly—yet in truth it is the question which underlies all the others, a *conditio sine qua non* of industrial success. I take leave to doubt whether any country could show a progress in Technical Education so encouraging, so phenomenal, as characterises the last fifteen years in Ireland. If it were my business to-night I could adduce the most complete and convincing evidence of this sweeping statement. And yet our organisation of Education is lamentably deficient. It is a problem that calls for concentrated and united effort.

BETTER EDUCATION THE FUNDAMENTAL NEED.

It is not yet realised that the profound change brought about by the industrial revolution, by the introduction of machinery and steam power, by the essential change in the nature of apprenticeship and the conditions of manufacture, and by the never-ending application of science to industry has rendered the Technical School essential to industrial progress. Yet it is true to say that the vast majority of our youths never receive any school education after the age of thirteen or fourteen—they never enter either an evening continuation school or a technical school—hence they receive little direct education for their business in life; such a state of things constitutes a grave national danger and calls for immediate remedy. Under such a condition it is little wonder that small regard is paid to the teachings of science and that our industries fall behind those of our rivals. I am conscious that the plea I make has an unspiritual, "utilitarian" ring, but it must be remembered that culture (as we understand it) and social amenities, while they may in a wonderful way exist side by side with poverty, find a more congenial soil in the material well-being that flows from industrial prosperity.

THE RESPONSIBILITY OF EMPLOYERS.

Even as things stand at present a great advance could be effected if employers fully realised the advantages to be derived from the technical education of their apprentices. They could, if they would, secure the attendance of all their apprentices at a technical school, and I think that they would be wise to give facilities for

attendance at day classes for a few hours in the week. I am fully aware of the inconveniences resulting from such a concession, but it would pay in the long run. Far greater burdens are laid upon German employers, but I will not dwell upon this point. I would only add that there exists under the Department a very comprehensive system of Scholarships not only carrying boys from the Primary schools through a very complete course of instruction in science and technology as good as can be obtained anywhere, but in the Apprenticeship Scholarships, securing to boys a full technical training during apprenticeship, and guaranteeing to him a maintenance allowance of 15*s*. per week throughout his period of apprenticeship.

A PLEA FOR SOLIDARITY.

After technical education perhaps the greatest desideratum is a sense of solidarity among manufacturers. I do not suggest that it is possible to supersede that healthy competition which is at once a valuable stimulus to economical production and a safeguard to the consumer. But beyond this there are many matters of vital importance to trade as a whole which can only be safeguarded by co-operative action. I will take a case in point. Up to a few weeks ago there did not exist any association or bond of union between the woollen manufacturers of this country, and hence the interests of this most important industry were neglected.

MANUFACTURERS' ASSOCIATIONS.

The Department used its influence, and that defect is, happily, now remedied; but there are many industries in which this necessary bond is still lacking. Chambers of Commerce and Industrial Development Associations, excellent though they are, cannot serve the interests of a trade, and in such a question we may well learn from our children. Our colonies have a message for us in this matter. "In Canada and in Australia" (I quote from a suggestive paper recently read before the Royal Society of Arts by Mr. Octavius Charles Beale, Past President of the Australian Manufacturers Association) "are provincial societies of industrials, usually incorporated, denominated in the former country Manufacturers' Associations, and in the latter Chambers of Manufacture. In each Dominion there is a control body, forming a union of the several provincial societies, which deal with matters of federal interest. It affords an opportunity to the delegates to consider and to make recommendations upon national matters as persons skilled in their own sphere and representative of important national interests. In Australia, at least, industrial courts settle the one question of difference between employers and employed, the payment and con-

ditions of labour. That settled, all the interests of the people engaged are at one, consequently, in industrial matters, manufacturers' associations represent large sections of the community —in Canada 520,000 employees, in Australia 340,000, besides much larger numbers dependent upon these."

It is not necessary to labour the advantages of such associations of producers. Their interests are distinct from those of distributors, and, indeed, may be entirely at variance with them, for the latter frequently deal with imported goods in competition with those produced at home. One of the many advantages of such associations would be that they could avail themselves for the good of the trade as a whole, of the advice and assistance which a Government Department is ready and willing to place at their disposal.

In conclusion, let me say that I believe it to be a mistaken notion that the growth of one industry is necessarily or generally inimical to the development of another. I believe, indeed, that the development of Irish manufacturing industries would re-act most beneficially upon agriculture, which owes so much to scientific discoveries and to the industries growing out of them. I have spoken of the feasibility of small but well-organised industries in Ireland, and we may reasonably look forward to a great extension of this kind in our smaller towns. With such an extension, the supply of motive power and of transit would become a simpler problem, and one might hope to realise the idea of the profitable utilisation of our stores of peat. Already this has been shown to be possible by means of the producer plant in which the peat, partially dried, is utilised *in situ* for the production of gas for use in gas-engines and conversion into electric power. This power can now be transmitted at high pressure to centres requiring it and there transformed and employed for industrial purposes. Things are moving in this direction, and the success which has attended the driving of looms for textiles by means of individual motors has further helped towards the solution of the problem.

SUMMARY.

The argument may be briefly summarised: The present juncture, notwithstanding the inevitable disturbance in the labour market, is favourable for active preparation for the great commercial developments resulting from the War. With the prospect of new markets it becomes essential to study the conditions for supplying them, and to adjust our methods of production and distribution accordingly.

The conditions existing in Ireland favour the establishment of small factory industries, which, with proper organisation, may compete successfully with larger ones elsewhere. It remains for

the opportunity to be seized. A condition essential to success is high efficiency in production, and this can only be secured by

(*a*) The technical education, not only of the army of workers but also of our "captains of industry." The facilities for this are now available but should be more generally availed of and in connection with this we may take some lessons from the educational organisation of Germany. The words of a recent writer are to the point: "Indeed the beating them without the learning from them would leave us more witless than we were before, for it would mean taking our errors into stock on the same footing as what verities we may have held, counting them in as part of the equipment which gave us the victory."

(*b*) A more intelligent appreciation of the importance of scientific research, and a greater readiness to apply the teachings of science to industrial uses. This will follow on the extension of technical training as also will the spirit of industry, and an improvement in our business methods.

(*c*) The cultivation of a "community of interests" among our manufacturers, which would be greatly assisted by the formation of manufacturers' associations which, while allowing full freedom for individual effort, would safeguard the interests of the trade as a whole and encourage its development.

The healthy stimulation resulting from such a forward movement would promote the growing sense of confidence in the successful development of Irish industries, and would encourage the adventuring of capital.

INVESTIGATIONS ON POTATO DISEASES.

(SIXTH REPORT.)

During the season of 1914 the special investigations on potato diseases, commenced in 1909 at the temporary phytopathological station at Clifden, Co. Galway, were continued. Reports of the work done in previous seasons will be found in Vols. X., XI., XII., XIII., and XIV. of this JOURNAL, at pp. 241, 417, 334, 445, and 433, respectively.

Taken as a whole, the season was, in Ireland, a fairly favourable one for potatoes, although not to the same extent as was the case in 1913. Fortunately the experimental plots, with which the present report deals, escaped almost unharmed the severe frosts of the fourth week in May, which played such havoc with the potato crop in certain localities. The blight made its appearance much later than usual, no sign of its presence being recorded, even in the West of Ireland, until the first week of July, and the season, as a whole, was characterised by comparative freedom from severe attacks of this disease. Towards the end of the growing period, it is true, the blight caused some damage in many districts, a considerable proportion of the tubers being found, upon digging, to be affected.

The diseases to which special attention was devoted were as follows :—

I.—THE ORDINARY BLIGHT.

(*Phytophthora infestans* de Bary.)

The experiments in connection with this disease dealt with the following matters :—

(1) Trials of the ordinary Bordeaux and Burgundy spraying mixtures, applied in the usual way as a wet, misty spray, against certain powders applied in the dry way to the foliage when damp.

(2) Trials of ordinary Bordeaux mixture, made in accordance with the instructions contained in the Department's Leaflet No. 14, against a spray fluid prepared from a Bordeaux mixture, recently put upon the market in the form of a paste.

(3) Trials of one per cent. against two per cent. Bordeaux and Burgundy mixtures.

(4) Trial of a Burgundy mixture made with potash against the ordinary one made with soda.

(5) Observations on the behaviour of certain varieties of potatoes reputed to be resistant to the blight.

(6) Observations on the results of using blighted tubers for "seed" purposes.

The greater part of the spraying experiments was carried out at the Agricultural Station, Athenry, the plots being under the supervision of Mr. T. O'Connell. Supplementary experiments were carried out under the superintendence of Mr. John Kelly, by certain Assistant Agricultural Overseers (Messrs. Tuite, Garvey, Murphy, and Cradock) on farms in the neighbourhood of Athenry. The remainder was arranged for at or near Clifden.

As in previous years a very close and careful watch was kept for the first visible signs of blight, but at Clifden it did not appear until 1st July, while at Athenry, in spite of very careful search, it was not observed until six weeks later, 14th August. At Clifden it made considerable headway, particularly in several of the unsprayed plots of supposedly blight resistant varieties, and from these it spread to adjacent plots and affected them to some extent, in spite of spraying. At Athenry its spread was comparatively slow and was most clearly marked on the plots dressed with powders.

Spraying Liquid versus Dusting Powder.

The plots on which the spraying experiments were carried out were on a uniform piece of land and were all treated in a similar manner as regards cultivation and manuring. The variety of potato used was "Up to Date," and the previous crop on this land was oats on lea. Each plot consisted of two drills, and had an area of two square perches statute. Against Burgundy and Bordeaux mixtures (prepared according to the methods described in the Department's Leaflet No. 14) two powders were respectively tested, one being composed of fine particles of copper sulphate and dry sodium carbonate (soda) intimately mixed, and the other being the dried precipitate, formed when copper sulphate solution is treated with milk of lime. A third powder, called "copper oxide hydrate," and stated to be a by-product in the manufacture of copper, was also tested. These three powders were similar to those tested during the previous season and, as will be seen from last year's report, gave results inferior to those given by the ordinary spraying mixtures. The powders were applied at the rates recommended by the manufacturers, and owing to the absence of rain during the greater part of the growing season it was found necessary to spray the foliage with water before dusting on the powder in order that it might adhere. The dusting was done with special knapsack bellows-machines recommended for the purpose. In all these spraying experiments the Bordeaux and Burgundy mixtures were applied at the rate of 100 gallons per statute acre for the first spraying and 120 gallons for the subsequent ones.

The plots were duplicated, one lot of them being sprayed or dusted three times and the other four times, at intervals of about

three weeks. There were thus ten plots in a series, two treated with Bordeaux and Burgundy mixtures and three with the powders described, this total of five being duplicated. It was further arranged that the series of ten plots should be set out in triplicate, and thus there were thirty plots in all. In taking the results of the plots the produce of each perch was lifted and weighed separately. Hence the yields given in the accompanying tables are the averages of the weighings of six separate square perches in each case. They are expressed in tons per statute acre.

All the plots were sprayed or dusted with the various powders three times, viz., on 27th June, 18th July, and 7th August. In this country farmers seldom spray potatoes more than twice, although some spray three times. There is a certain amount of difficulty, of course, in carrying out the third spraying, at any rate where it is done with a horse-drawn machine, for at the time when this is due the haulms of the plants have usually grown to such an extent that it is almost impossible to use the spraying machine without the risk of causing a considerable amount of mechanical damage to them. In seasons when, primarily on account of weather conditions, the attack of blight is a late one, a third spraying is very necessary, and particularly in experimental plots like those at present under consideration it is very important that the various fungicides should be on the foliage when the blight comes, whether late or early, in order that their efficiencies may be compared. It was, therefore, arranged at the outset that one half of the total number of plots should be sprayed or powdered six times, if necessary, during the season. One half of the plots, as a matter of fact, did receive a fourth dressing, applied on 28th August. But when the time for a fifth arrived it was found that practically all the foliage on all the plots was already dead so that a further application appeared superfluous.

The progress of the blight in its effect on the foliage could easily be followed. The first spots of it were observed, as stated above, on 14th August, one week after the third spraying and in one of the powdered plots. Up to this time the weather had been exceptionally dry, but soon after the middle of August it broke and rain fell; and by the 18th spots of blight were observed on all the plots. By the end of the month, which continued wet, the blight had made considerable headway, particularly so on the powdered plots, which stood out quite conspicuously from the sprayed plots, in which the foliage was much less severely attacked.

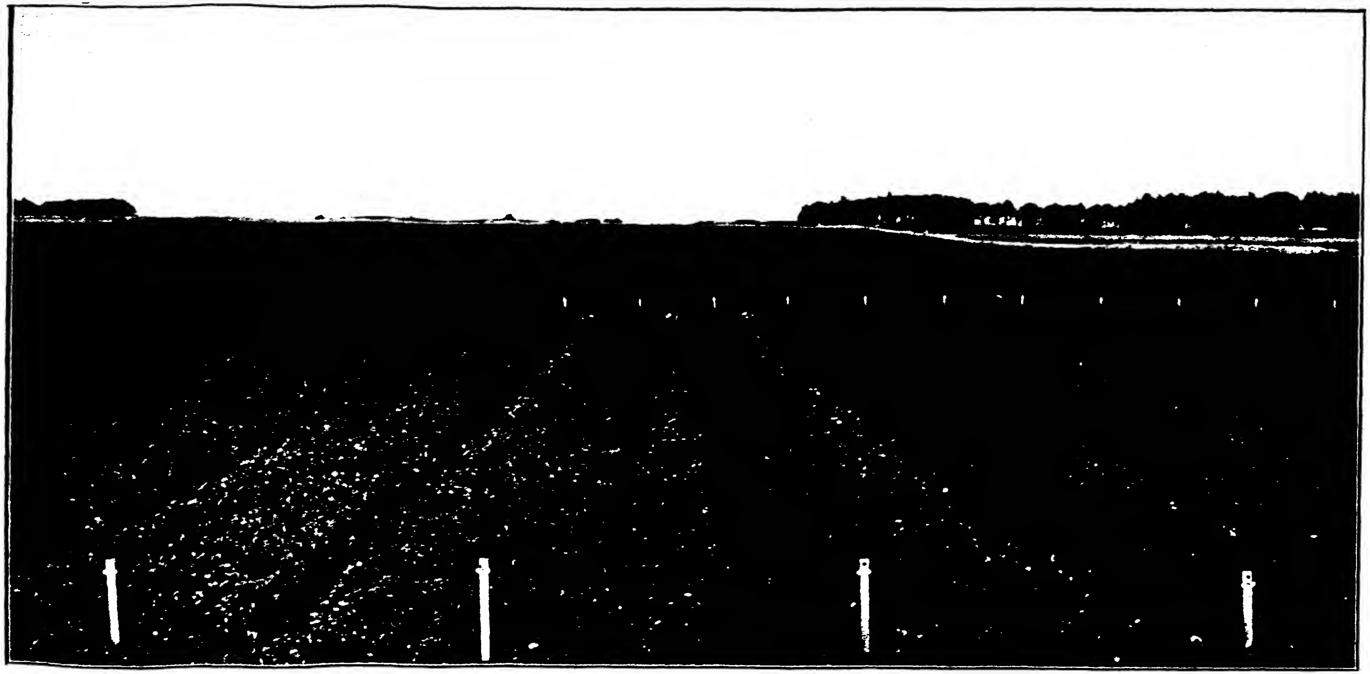
With regard to the details of the comparative yields of the plots, those sprayed with Burgundy mixture and those dusted with a copper sulphate and soda powder may be considered first. It was in a plot treated with this powder that the blight first made its appearance, and the plots so treated developed subsequently a greater

degree of blight in the foliage than did the sprayed plots or even those dusted with three other powders. Certain disadvantages in the use of this particular powder, which need not be repeated here, were alluded to in last year's report, and it was then found to be inferior, in four series of experiments, to Burgundy mixture. This inferiority was again shown in 1914, in two tests, and in the following table the results of both seasons' tests are incorporated :—

Season.	Number of Applications.	Spray.				Powder.			
		Total Crop.	Healthy.	Blighted.	Per cent. Blighted.	Total Crop.	Healthy.	Blighted.	Per cent. Blighted.
1913	3	10·7	10·5	0·2	2·3	9·6	9·2	0·4	4
	3	11·4	10·5	0·9	8	10·5	8·5	2	19·3
	3	12·7	12·7	0	0	11·7	11·7	(4 tubers)	0
	3	13·11	13·1	0·01	0·12	12·1	11·9	0·16	1·3
1914	3	16·4	15·8	0·6	3·7	13·1	12·4	0·7	5·4
	4	16	15·4	0·6	3·5	14·8	13·8	1	6·9

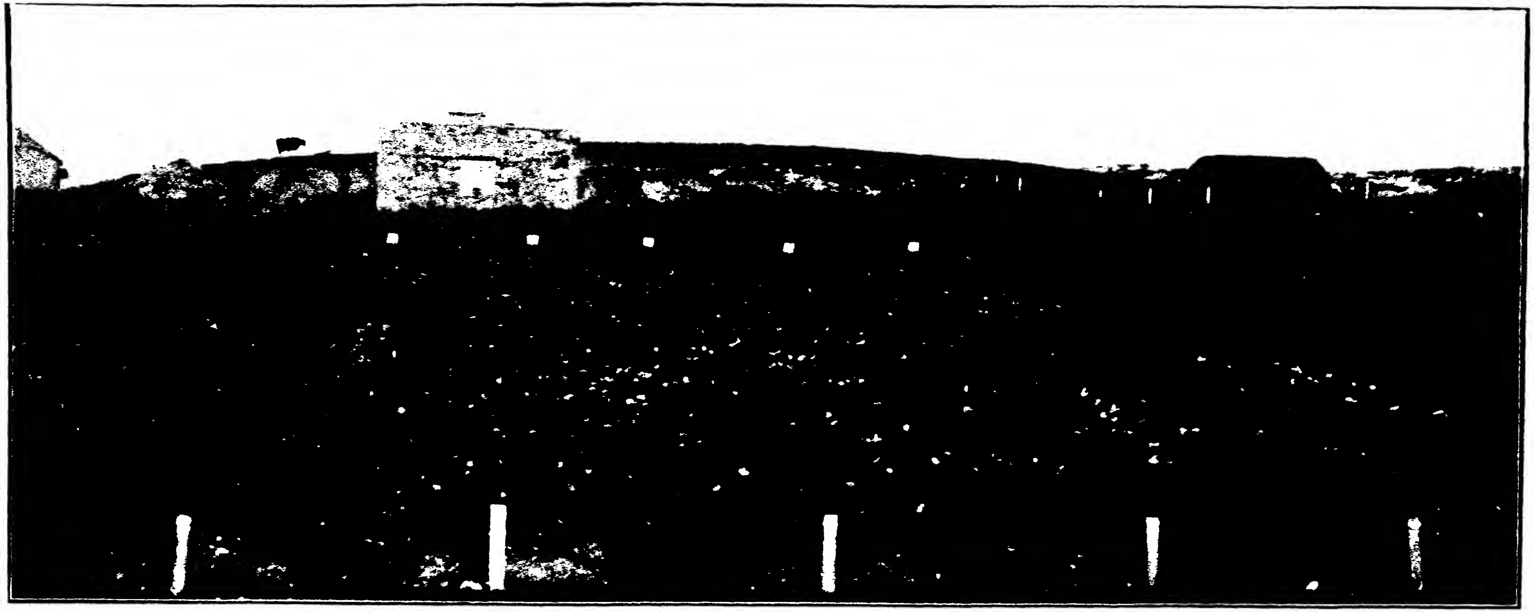
From the above it will be seen that by the use of this powder rather than the ordinary Burgundy mixture there has resulted in every case (1) *a loss in total crop* (averaging nearly one and a half tons per statute acre), (2) *a diminished yield of healthy tubers* (averaging nearly two tons), and (3) *an increase in the percentage weight of blighted tubers* (averaging over 100 per cent.). These results were obtained during two seasons, in neither of which was the attack of blight severe. In a season in which the blight was severe it seems reasonable to suppose that the powder would show up even worse than it has done in these two seasons. This powder, therefore, like various other articles, put on the market from time to time to replace the ordinary spraying mixtures, must be pronounced to be, under Irish conditions at least, a distinct failure.

In Fig. 1 a photograph is reproduced, showing on the left (plots 1 and 2) two plots sprayed in the ordinary way, three and four times respectively, with Burgundy mixture. On the right (plots 3 and 4) are the corresponding plots dressed with the copper sulphate-soda



1 2 3 4

Fig. 1.—Plots 1 and 2 (comparatively free from blight) sprayed three and four times, respectively, with Burgundy Mixture. Plots 3 and 4 (seriously blighted) dusted, when damp, three and four times, respectively, with copper sulphate and soda powder. *See p.* 494.



Duchess of Cornwall | Shamrock | Clifden Seedling | Champion II. | Northern Invincible.

Fig. 2.—Plots showing the contrast between a non-blight-resistant variety (Duchess of Cornwall) and four strongly blight-resistant varieties. Photographed August 11th, 1914. *See p.* 503.

powder three and four times. At the time when the photograph was taken (11th September, 1914) the Burgundy sprayed plots still retained a mass of green foliage, while on the powdered plots scarcely a green leaf was to be seen.

Coming next to the plots in which Bordeaux mixture was tested against a powder prepared by precipitation from milk of lime and copper sulphate solution, and another, called copper oxide hydrate, it was very evident during the growing season that these two powders were much less effective in keeping the foliage free from blight than was ordinary Bordeaux mixture, the contrast being only slightly less well marked than in the case of the Burgundy and copper sulphate-soda powder plots. The following table shows the relative yields of these plots:—

Fungicide Used.	Three Applications.				Four Applications.			
	Total Crop.	Healthy.	Blighted.	Per cent. Blighted.	Total Crop.	Healthy.	Blighted.	Per cent. Blighted.
Bordeaux Mixture	15·8	15·1	0·7	4·5	15·9	15·4	0·5	3·3
Precipitated Powder	16·7	15·1	1·6	9·4	16·1	15·1	1	6·1
Copper Oxide Hydrate Powder	17·1	15·7	1·4	8·2	17	15·8	1·2	6·9

From these results it will be seen that, although increased total yields were obtained where the two powders were used, yet the proportion of blighted tubers was greater than where the Bordeaux spray was applied, and thus the differences in the yields of healthy tubers show no very great variation in amount. It is sometimes maintained that potatoes receive a slight check as a result of spraying with Bordeaux and Burgundy mixtures, although it is difficult to find direct, quantitative evidence that this is really so. In any case this slight check, if it does occur, is more than counterbalanced in average years in this country by the undoubted ultimate gain due to spraying. It is possible that in a dry season, like that of 1914, a check more than usually pronounced was caused by the fungicidally efficient Bordeaux mixture, whereas the powders, strikingly less efficient as fungicides, caused less check to growth. During the previous season these two powders gave decidedly inferior results

when tested against Bordeaux mixture, so that they certainly cannot be recommended unreservedly at present. Further tests are planned to be carried out with them, and it seems probable that their inferiority is likely to be well marked in seasons when the weather conditions favour the spread of the blight.

Bordeaux Mixture versus Bordeaux Paste.

In previous reports in this series mention has been made of trials of Bordeaux and Burgundy mixtures, prepared in the ordinary way, against proprietary spraying materials, one of which was a mixture made by adding water to a prepared paste. The particular paste used was stated to be manufactured by treating copper sulphate solution with limewater and not with milk of lime. The precipitate of basic copper sulphate formed by this process is less rich in copper than that formed when milk of lime is used, and it was claimed that this salt of copper is transformed from its insoluble to a soluble form more rapidly than is the case with the other basic sulphate formed when milk of lime is used. From this it was argued that the spraying mixture prepared from the paste would be more efficacious than the mixture prepared in the ordinary way. As far as the potato blight is concerned, however, this assumption has proved in practice in this country at any rate to be erroneous, as a consideration of the annexed results will show.

This paste, in addition to being experimented with at Clifden, was also subjected to field trials elsewhere by the Department in the years 1909 and 1910. All the trials showed in the clearest fashion that the mixture prepared from it was not nearly so efficacious in preventing blight as were Burgundy and Bordeaux mixtures prepared in the usual way. Such trials also revealed the unwisdom of dogmatising on the practical efficacy or otherwise of particular fungicides merely on the basis of chemical equations or of laboratory experiments in which the operating factors may not approach those prevailing under field conditions.

In the following table the average yields of *healthy* tubers per statute acre obtained in the trials for the two seasons, are compared, those from the plots sprayed with Burgundy (which were the heaviest in both years) being reckoned as 100. In 1909 the actual yield of healthy tubers of the Burgundy plots averaged 12·51 tons, and in 1910 11·67 tons per statute acre.

Year.	Burgundy Mixture.	Bordeaux Mixture.	Paste Mixture.
1909	100	94	75
1910	100	96	68

Theoretical Considerations.

A little consideration will show that this decided inferiority* of the paste mixture might perhaps have been anticipated. What is claimed for this paste, as perhaps one of its most valuable properties, viz., the rapidity with which the insoluble copper compound in it is rendered soluble, is probably to be looked upon rather as one of its most serious defects, and the very antithesis of what is desirable in a spraying mixture for use against the potato blight. What is required in such a case is not a mixture in which a soluble copper compound will be produced *rapidly* from the precipitate when sprayed upon the foliage, but one in which this process takes place *slowly* (or possibly, better still, not at all). With rapid production of the soluble copper salt the fungicidal value of the precipitate is only ephemeral and soon becomes exhausted, whereas it would be much more persistent and correspondingly greater if the precipitate contained relatively larger amounts of the insoluble copper salt which were rendered soluble slowly over a longer period of time.

These considerations involve the assumption that the rendering soluble of the copper salt is due to the agency of atmospheric carbon dioxide. From the recent researches of Barker and Gimmingham,† however, it seems most probable that this does not occur, but that in reality the poisoning of the parasite is due to the absorption by it of a copper salt, rendered soluble by a secretion produced by the parasite itself. If this be the case the ideal spraying mixture would be one containing a precipitate, which possessed the maximum of covering power and capacity for adhering to the foliage, but a minimum or no loss of copper by solution by atmospheric agency, provided, of course, that such precipitate were capable of being dissolved and absorbed by the parasite.

Bordeaux Paste.

The paste used in 1914 was not the same as that tested in previous seasons, being made by a different manufacturing firm. It was stated to be prepared by combining commercially pure, 99 per cent. sulphate of copper and hydrated, selected lime. These ingredients are of course, similar to those used in the preparation of Bordeaux Mixture by the farmer, but it is claimed by the manufacturers that the use of their special paste "overcomes the difficulty of ensuring the purity and thorough combination of the ingredients experienced by most growers in preparing a home-made mixture." This claim may, of course, be justified, but it must be remembered that one of the essential virtues of the home-

* Further evidence of this inferiority will be found in the results of Mr. Oldershaw's experiments published in this JOURNAL, Vol. VI. No. 3, April, 1911, p. 450.

† For summary of these researches see Annual Report, Agricultural and Horticultural Research Station, Longashton, Bristol, 1913, p. 56, where the literature is cited.

made mixture is that the precipitate, when freshly formed, is in a colloidal or gelatinous condition, thus ensuring good adhesion to the foliage. After being kept for no very long period this condition changes and it cannot be conserved when the precipitate is brought to the form of a powder or a paste.

The trial of this new paste was carried out on the farm of Mr. J. Ward, Cushatrough, near Clifden. There were twenty similar plots, each of one square perch in area, arranged chess-board fashion. The alternate plots were sprayed, respectively, with Bordeaux mixture and a mixture made from the paste, in the manner recommended by the makers. Four applications of equal amounts were made, viz., on 9th, 29th July, 18th August, and 3rd September. Soon after the first spraying it was distinctly noticeable that whereas the Bordeaux mixture adhered well to the foliage and remained clearly visible, the spray prepared from the paste disappeared much more rapidly, being almost invisible eight days after its application. The first signs of blight were observed on 17th July, and by the time of the second spraying, on 29th July, it had spread but slightly on the plots treated with Bordeaux mixture, but visibly more so on those treated with the paste mixture. Between the second and third sprayings the comparative non-adherence of the paste mixture was again observed and at the time of the third spraying the preponderance of blight on the plots sprayed with the paste mixture was visible even to a casual observer. At the time of the fourth spraying most of the foliage on the plots sprayed with the paste mixture was blighted and dead, whereas, on the plots treated with Bordeaux mixture, there was still a considerable amount of healthy green foliage. There was thus during the growing season visible evidence of the superiority of the Bordeaux mixture as far as the haulms and foliage were concerned.

The tubers were raised on 29th September, when the foliage on both sets of plots was withered and dead. It was noticed that the tubers did not break off so easily from the plants sprayed with the Bordeaux mixture as from the others, which is not surprising, seeing that these plants remained green much longer than the others and were thus less ripe.

The following are the average results of the ten plots in each case, the yields being expressed in tons per statute acre :—

Fungicide.	Total Crop.	Healthy.	Blighted.	Per cent. Blighted.
Bordeaux Mixture ..	13·33	13·25	0·08	0·61
Paste Mixture ..	13·12	12·82	0·3	2·28

Although the differences are not very great yet the distinct superiority of the Bordeaux mixture is clearly brought out in this table, and there is little doubt that if the season had been one favourable to the development of blight the differences would have been more marked. It may be added that the cost of the materials used in spraying these plots was inversely proportional to the benefits obtained, the cost of the paste being about twice that of the Bordeaux mixture, although this ratio would probably be somewhat reduced if larger quantities of the paste were purchased at a time.

The various trials of proprietary spraying materials made during recent years in Ireland all point to the conclusion that the properly prepared home-made Bordeaux and Burgundy mixtures are to be preferred for use against the potato blight, not only on account of their superior fungicidal efficiencies but also on account of their lower cost. If manufacturers really desire to assist the farmer it would be far better for them to cease pushing the sale of materials of unproved value, or of proved inferiority, and to place upon the market copper sulphate, soda and lime, of a guaranteed and high standard of purity, packed in a convenient way and ready for immediate use, without the necessity of weighing. Thus, since a 40-gallon barrel is most frequently used for preparing the mixture the copper sulphate might well be put up in 8 pound lots, in canvas bags, each provided with a loop of string, so that it could be hung from a stick, directly, into the 35 gallons of water in the barrel. The soda would be put up in 10 lb. lots, perhaps in bags, or cartons of parchment-paper, or waterproof pasteboard. The lime, in 4 lb. lots, might present some difficulty, but possibly air-tight tins, such as are used for calcium carbide, etc., could be employed, without costing too much.

The farmer would, of course, have to pay for the cost of packing and packages, but he would be saved all trouble in weighing and all anxiety as to the purity of the materials, provided they were put up and guaranteed by a first class firm. Acting on this suggestion one well-known Dublin firm made a start in this direction last season, and it remains to be seen to what extent the system may develop.

Strength of Mixtures.

In previous seasons comparative trials have been made with the ordinary Bordeaux and Burgundy mixtures, prepared from a 2 per cent. copper sulphate solution, and weaker mixtures, prepared from a 1 per cent. solution of copper sulphate. The results have shown that in some cases the weaker solution has been as good as, or better than, the stronger one, while in other seasons the reverse has been the case. During the season under review further trials were made, some of the plots being situated at the Athenry

Agricultural Station, and the others on four farms in the neighbourhood of this Station. The plots at this Station were similar to those already described in connection with the powder trials, and each was sprayed three times. Those at the four farms were in charge of Assistant Agricultural Overseers, each had an area of five square perches statute, and four applications of the spraying mixtures were made in each case. The following table gives a summary of the average results (each perch having been weighed separately), the yields being expressed in tons per statute acre :—

	Mixture.	No. of Plts.	2 %				1 %			
			Total.	Healthy.	Blighted.	% Blighted.	Total.	Healthy.	Blighted.	% Blighted.
Agricultural Station, Athenry	Burgundy	6	15·47	14·34	1·13	7·30	16·22	14·86	1·36	8·38
	Bordeaux	4	16·09	15·23	0·86	5·34	17·11	15·61	1·5	8·76
Assistant Agricultural Overseers	Burgundy	4	9·49	9·44	0·05	0·52	9·64	9·53	0·11	1·07
	Bordeaux	4	9·55	9·49	0·06	0·61	10·16	10·04	0·12	1·2

It will be observed that with the use of the one per cent. mixtures both a greater total yield and a slightly greater yield of healthy tubers was obtained in every case, but that in every case also the percentage weight of blighted tubers was greatest where the weaker strength was used. It is hoped to continue the experiments of this kind over further seasons, but the work done during the past few years appears to show that, provided the spraying is done thoroughly, the differences due to the use of spraying mixtures of the two strengths named are not very great one way or the other; and if for any reason the prices of materials suffered any serious advance there should be no hesitation in spraying potatoes with a mixture of one half the strength usually recommended rather than not at all.

Potash-Burgundy Mixture.

It is a widespread belief in many parts of the West of Ireland that Bordeaux mixture is preferable to Burgundy mixture for spraying potatoes, because the former contains lime. The farmers believe that this lime is made use of by the potato plant through absorption by the foliage, a larger crop being the result. There is, however, no definite evidence that larger crops are, as a rule, produced when Bordeaux mixture is used than when its place is taken by Burgundy mixture; on the other hand the results of experiments show that sometimes a larger crop is obtained with

one and at other times with the other of these two mixtures (other conditions being the same). It is, of course, known that substances (especially if in solution) may be absorbed by foliage, and it was thought worth making some experiments on a small scale, at any rate, to see what would be the effect of combining with the mixture used against the blight a substance which would, if absorbed, be of benefit to the potato plant. The substance which suggested itself, naturally, was some salt of potassium. Instead, however, of adding this to the spraying mixture the idea occurred of making the potassium salt one of the actual ingredients of the mixtures and a Burgundy mixture was, therefore, prepared by precipitating copper sulphate with commercial potassium carbonate instead of the usual sodium carbonate (washing soda). Similar plots were sprayed, both in 1912 and 1913, with soda and potash Burgundy mixtures, but there were no striking differences in the behaviour of the plants in the plots and no accurate quantitative results were taken. In 1914 two series of four plots, each of one square perch in area, were sprayed with these mixtures and the average yields obtained. The results showed a very slight advantage in favour of the potash mixture, for with it there was a very slight increase in total crop, a gain equivalent to one-eighth of a ton per statute acre in the yield of healthy tubers and a diminution of about one-sixth in the weight of blighted tubers present. The gain is, however, so small that it is of no serious practical importance and would certainly not justify recommending a change from the use of soda to that of the more expensive potash in preparing Burgundy mixture. Assuming that the slightly increased yield was due to the potash it is, of course, quite as probable that the plants obtained it by their roots from what was washed off the foliage into the soil as through the foliage itself direct.

Resistance to Blight.

Since 1910 certain varieties of potatoes have been grown each season at Clifden, and have been left unsprayed with a view to observing their relative powers of resisting the attacks of blight. Those varieties which have proved themselves capable of retaining their green foliage with little or no blight on it, up to the end of the growing season, may be regarded as highly resistant. During 1914 observations were made on about a dozen varieties. Four of these, viz., Langworthy, Golden Wonder, Peacemaker, and What's Wanted appear to have a good repute in England* as blight resisters, but they failed to exhibit this character at Clifden, at least as re-

* See Order of Board of Agriculture and Fisheries (England) of Feb. 2nd, 1914, published in *The Gardeners' Chronicle*, Vol. lv., No. 1416, 1914, p. 107, where it is stated that these four varieties "are probably unsurpassed as resisters of ordinary Potato Disease."

gards their foliage and stalks. By the first week in August the plots of these varieties were all seriously blighted, What's Wanted being slightly less so than the other three. By the end of that month the foliage was completely destroyed with blight, there being no green leaves whatever left. The yields were small, being only at the rate of from just over three to just over four tons to the statute acre, but the yield of diseased tubers was not large. It was least in What's Wanted (0·7 per cent.) and greatest in Langworthy (4·6 per cent.). The comparatively small amount of blight in these tubers may be due to their actual resistance to the parasite, but on the other hand it may also be explained, to some extent at least, by the fewness in number and small size of the tubers produced as well as by the rapidity with which the foliage was destroyed, so that the period during which spores were falling from it to the soil was a comparatively short one. A small plot of the variety King Edward VII. was also grown unsprayed, but in this case too the foliage was almost entirely destroyed by blight by the second week in August. Nevertheless, out of a yield of twenty-nine lbs. only two small tubers were found blighted.

Eight other varieties were grown under similar conditions in half-perch plots, namely, Champion II., Clifden Seedling, Shamrock, Northern Invincible, Summit, Arran's Hope, Arran Chief, and Duchess of Cornwall. Of these the first four were known from the experience of previous seasons to be highly blight-resistant, the following three came with something of a reputation in this respect, while Duchess of Cornwall, being known to be non-resistant, was used as a control. This last-named variety was found to be somewhat spotted with blight on 10th July and a similar state of affairs also existed at that time in Summit, Arran's Hope, and Arran Chief. the other four varieties being then quite free from blight. The foliage and stalks of the Duchess of Cornwall variety succumbed very rapidly, so that in the second week of August there was not a green leaf left and the stalks also were blackened. Arran's Hope also fared badly, while Arran Chief and Summit withstood the blight slightly better. Nevertheless, these varieties did not hold out well and their foliage was practically completely destroyed by the beginning of September. The behaviour of Champion II., Clifden Seedling, Shamrock, and Northern Invincible was in striking contrast to that of the varieties just dealt with. They retained their green foliage until the end of the growing season, when the two first-named showed little or no signs of blight, while the second and third certainly had their foliage somewhat spotted with it. Judging from the relative degree of blight attack on the foliage and stalks these varieties may be arranged as follows :—

$$\left.\begin{array}{l}\text{Champion II.}\\\text{Clifden Seedling}\end{array}\right\}\text{ very highly resistant.}$$

Shamrock Northern Invincible	highly resistant.
Summit Arran Chief	feebly resistant.
Arran's Hope	non-resistant.
Duchess of Cornwall	highly susceptible.

It may be mentioned that the two first-named varieties are in all probability identical, no distinguishing characters having been recognised between them during the five seasons in which they have been grown.

The appearance of the stalks and foliage of some of these varieties on 11th August may be seen from the photograph reproduced in Fig. 2, in which the susceptibility of Duchess of Cornwall to blight is very clearly shown. The plants in the plots surrounding those named were sprayed and consequently did not show much blight at this date.

The total yields, of course, varied, these being from about seven and a half tons per statute acre in the case of Northern Invincible to less than three in the case of Duchess of Cornwall. If the varieties be arranged in order according to the relative percentage weight of blighted tubers in each case, the list will be as follows. In the case of Duchess of Cornwall this weight was 14·8 per cent., and putting this as 100 the relative figures for the other varieties are as given.

Variety.	*Degree of blight in tubers.*
Champion II.	0
Clifden Seedling	0
Summit	2
Arran Chief	5
Shamrock	9
N. Invincible	19
Arran's Hope	24
Duchess of Cornwall	100

In comparing this list with the previous one, in which the same varieties are compared as regards the prevalence of blight on the overground portions of the plants, it will be seen that Summit and Arran Chief have changed places with Shamrock and Northern Invincible.

One plant of another variety not yet in commerce was also grown at Clifden, which showed remarkable powers of blight resistance, equal to those of Champion II. and Clifden Seedling. It is hoped to make further observations on this variety during the coming season. It was grown in some quantity at the Athenry Agricultural Station, where it also remained, throughout the season, remarkably free from blight, although in this case it was sprayed.

The high degree of resistance to blight exhibited by Champion II. is strikingly shown in the photograph reproduced in Fig. 3, taken on 14th August, 1914. On the left is the blight-free Champion II., while on the right is a plant of Duchess of Cornwall, completely destroyed by the blight. The plants were grown under identical conditions, in adjoining plots, and were typical of the plots as a whole. They were removed to pots merely for convenience in photographing.

Result of planting blighted tubers.

The source from which the blight takes its origin each succeeding season is still a matter of conjecture. It is now well known that the potato blight fungus is capable of developing resting spores *in artificial cultures.* If these spores occurred in the potato plant it would be natural to suspect them of reaching the soil upon the decay of the plant, of resting there during the winter and of becoming active and causing infection of the new crop in the spring or summer. Up to the present, however, it has to be confessed that diligent search for such spores *in the plant* has met with no definite success. Nevertheless, one is still reluctant to abandon the idea of the possibility of infection from such a source entirely. It seems practically certain that the sexually produced resting spores with their adherent antheridia, as seen in artificial cultures do not occur in the potato plant. But it is still conceivable that the unidentified thick-walled resting spores, not infrequently found in the decayed tissues of blighted foliage, etc., *may* be parthenogenetically produced resting spores (oospores) of the potato blight fungus, and such spores do occur in artificial cultures. Up to the present, however, it has not been found possible to observe the germination of these spores or to learn anything of their true nature or origin.

The question of the possible origin of the blight from diseased tubers has already been discussed in these reports as well as elsewhere, and the fallacy of the so-called "dormant mycelium theory," has been exposed, hence it is not necessary to go over the ground again here. One of the most likely sources of origin would appear to be as follows. When a blighted but still partially living tuber is planted it is possible that one or more of its sprouts will come above ground which may be already diseased (or will soon become

Champion II. Duchess of Cornwall.

Fig. 3.—Contrast between blight-resistant and non-blight-resistant varieties of potatoes. *See p.* 504.

Fig. 4.—Potato plots planted on April 7th and photographed on August 11th, 1914, showing the havoc wrought by the Stalk Disease. *See p.* 509.

so) by the direct entrance of the mycelium of the fungus from the diseased parent tuber into them. On the surface of such diseased sprouts above ground the fungus would probably fructify and thus spores would be available for aerial distribution. This certainly does occur occasionally under experimental conditions, when diseased potatoes are planted in pots, and particularly if they are kept in a greenhouse, even a cool one. It occurred under such conditions in two sets of experiments, carried out in 1913, in greenhouses at the Royal College of Science and the Albert Agricultural College, Glasnevin, respectively, and further, at the latter institution, it occurred in one case in a pot plunged in the soil in the garden, but covered with a bell jar.

Each season at Clifden during the past five or six years one or more plots have been planted with badly blighted tubers, and a very careful watch has been kept over the behaviour of the produce above ground (if any) of such tubers. In 1914 two such plots were planted, each containing one hundred blighted but still partially living tubers, having one or more living sprouts. In the first plot, planted on 2nd May, seventy plants had developed within 25 days, while three of the tubers had been carried away by rats or crows. In the second plot, planted on 7th May, only forty-six plants resulted. These one hundred and sixteen plants were all healthy and only became blighted later on when the disease was more or less general over all the other plots at Clifden. In no single instance, during the past five years in which this experiment has been repeated at Clifden, has a blighted tuber been observed to develop a blighted sprout above ground, such as has occurred occasionally when such tubers are planted in pots. One possible explanation of this is that the tubers planted in the open at Clifden may have been set so deeply in the soil that any blighted sprouts which they developed were killed outright before they had grown sufficiently long to appear above ground, and it is proposed to test this supposition by planting some of the blighted tubers at Clifden in the coming season less deeply. So far the result of planting blighted tubers in the open ground at the ordinary depth common in prac ice has been that they give rise either to complete "misses" or to healthy plants.

There is a further possible source from which the blight may take its origin each season, and that is from superficially developed spores produced by the fungus present in blighted tubers (or parts of them) which have not been used for "seed" or other purposes, but which have been discarded from pits or stores and left lying about, above ground, in the neighbourhood of potato plots. Cases have been noted, in which the blight has started on plants in the neighbourhood of potato pits of the previous season, which lend some colour to this suggestion.

II.—The Stalk or Sclerotium Disease.

(*Sclerotinia sclerotiorum* Massee.)

The experiments which have been carried on for the past few seasons dealing with the influence which the date of planting exerts upon the incidence of this disease were continued during 1914.

Thirty-six plots, each of one square perch statute in area, were laid down in connection with this disease. Eighteen of them were on land which had borne potatoes seriously affected with it in the previous season and which, therefore, contained very large numbers of the *sclerotia* or resting bodies of the fungus. The remaining eighteen plots were on adjoining land which had been in grass for many years and which did not contain these sclerotia. As regards cultivation, manuring, and spraying for blight, all the plots were treated similarly.

Owing to unavoidable circumstances the planting of the first plots could not be carried out quite so early as was the case in the two previous seasons, and this was not done until the beginning of April. Subsequent plantings were made at approximately fortnightly intervals, the last planting being made in the middle of June.

Three varieties were used in the plots, viz., Champion, Irish Queen, and Up-to-Date, all of which are quite susceptible to the disease. At intervals of about a fortnight each the number of affected plants out of the one hundred and twenty planted in each plot was ascertained and the relative progress of the disease thus measured.

As is well known, the sclerotia which remain over winter in or on the soil germinate in the spring and produce the so-called "spore-cups" or *apothecia*, from which the ripe spores are ejected into the air, and can be seen in the form of little clouds resembling puffs of smoke. The first "spore-cup" was found at Clifden in 1914, on 30th May, and the first potato plant visibly affected with the stalk disease was found on 8th June.

In the following table the average number of affected plants found per plot, at the six successive periods of counting, are given. The first count was made on 3rd July and the last on 18th September. The plots in Series I. were on old land, those in Series II. on new land.

Time of Planting.	Series.	No. of affected plants at successive count.					
Beginning of April ..	I.	9	64	78	91	108	112
	II.	32	92	107	112	114	117
Middle of April ..	I.	2	49	58	68	108	113
	II.	20	67	86	103	106	114
Beginning of May ..	I.	4	23	31	39	59	90
	II.	42	73	81	83	84	100
Middle of May ..	I.	--	0	1	16	30	48
	II.	—	0	6	19	26	42
Beginning of June ..	I.	--	0	2	24	35	41
	II.	--	0	0	14	21	30
Middle of June ..	I.	--	—	0	0	0	0
	II.	—	—	0	0	0	0

The figures given show very clearly that on the whole the number of affected plants diminishes with increasing lateness in planting, the reduction being remarkably striking in the plots planted from the middle of May onwards.

The table also shows that the period at which the rate of increase of infection is greatest is—at any rate as far as the earlier plots are concerned—that covered by the first two or three countings, which extended from the first week in July to the first week in August. This period and that shortly preceding it is also the one during which the prevalence of ripe "spore-cups" (and the distribution of their spores) is at its maximum. After this time it becomes increasingly difficult to find these spore-cups on the soil, although it is true that a few of them may occur almost up to the close of the growing season.

In view of what has been stated by other writers on this disease it does not seem to be superfluous to emphasize here once more the fact that the fungus which causes this disease produces only one class of spores, namely, ascospores, developed in the asci of the apothecia or "spore-cups." It has *no* conidial condition comparable to the Botrytis stage, which some species of Sclerotinia possess, a

fact which has been determined from studies carried out with pure cultures of the fungus, both at Clifden and elsewhere.

A rather unexpected result which the table reveals is that the rate of infection on the new land, where sclerotia were absent, was considerably greater than on the old land, where sclerotia were plentiful. One reason for this is probably the fact that the old land lay immediately above and north of the new land and the prevalent wind was from the north and north-west during the main period of infection. Hence the spores ejected from the apothecia in the old land were carried in large quantities by the wind from the plots on the old land to those on the new and caused greater infection amongst the plants of the latter.

Another possible explanation of the fact of the increased attack in the plots on the new land may be found in the manner in which the infection of the plant occurs. It has been stated in previous reports of this series that the old view that the plants are attacked only at soil level, and from the mycelium of the fungus living as a saprophyte in the soil, is not correct, and it has been proved experimentally that infection is borne aerially. The spores carried by the air reach the potato foliage and stalks and the infection of the latter occurs without the intermediary of the soil at all.

So long, however, as the foliage and stalks are vigorous, healthy, and unwounded, infection does not readily occur, if indeed it does at all. When, on the other hand, the older leaves fall, the wounds left at the leaf-scars may form suitable points of entry for the fungus. Observations carried over several seasons force one to the belief that the principal source of infection is through the older yellowing leaves before they fall. During the past season especially, abundant evidence was forthcoming in support of this view of the mode of infection. As soon as leaves begin to yellow off they are no longer capable of resisting direct infection from aerially borne spores. They become attacked by the fungus, which develops rapidly on them, and passes from them to the still healthy stalks which bear them. Hence it is that the attacks of stalk disease on the stalks themselves occur primarily at the nodes.

Possibly a more vigorous growth on the part of the plants on the new land may have led to a greater and earlier development of foliage susceptible to attack than was the case in the slower growing plants on the old land, and thus the attack was more severe on the plants growing on the new land.

Reduction of Attack by late Planting.

From the experiments of this and of the last few seasons it has been conclusively proved that the attacks of this disease can be reduced very considerably by late planting. When, however, such planting is delayed to a very late date the available period for the growth and development of the crop is seriously curtailed, and diminished yields will be the result.

The average total yields of the plots devoted to this disease in 1914, expressed in tons per statute acre, are summarised in the following table. The yield of Up-to-Dates was in every case greater than that of either the Irish Queens or the Champions.

Time of Planting.		Series I. Old Land.	Series II. New Land.
Beginning of April	..	11·2	9·2
Middle of April	..	11	10
Beginning of May	..	9·6	10·2
Middle of May	...	8·6	9
Beginning of June	..	4·9	6·4
Middle of June	..	2·9	4·1

It will be observed that the maximum crop on the old land was obtained by planting at the beginning of April, whereas the greatest crop on the new land was obtained by planting a month later. Planting at a really late period, however, results in a diminished crop, in spite of the diminished incidence of the disease. In 1913 the best results were obtained by planting in the middle of April, and in 1912 in the middle of May. Doubtless the climatic influences of the different seasons play some part in determining the yields of the plots planted at different dates, apart altogether from the effect on them due to the incidence of the disease in question.

Resistance to Stalk Disease.

Although it was not found possible to make any accurate quantitative determinations on the subject, some observations on the relative resistance of different varieties of potatoes to the stalk disease were made during the season. It was found, for example, that no case of disease existed in the plots of Champion II., Clifden Seedling, and Summit, although these plots were quite as favourably situated, as regards facilities for infection as were the Up-to-Dates, Irish Queens, and Champions dealt with in the foregoing tables. Other varieties, such as Northern Invincible, Shamrock, Arran Chief, Arran's Hope, and Black Skerry, although attacked to some extent were very considerably less so than the three varieties named or than Duchess of Cornwall.

The havoc wrought by the stalk disease is well illustrated in Fig. 4. The plots shown were planted on 7th April, 1914, and the photograph was taken on 11th August when, as will be seen, the number of unaffected plants in them was few and far between, while a great many of them were completely dead.

III.—Pink Rot and Wilt.

(*Phytophthora erythroseptica* Pethyb.)

It was pointed out in last year's report that the fungus which causes the Pink Rot of the potato is not confined to the tuber, but may attack any or all of the underground portions of the plant. It was also stated that it had been established with practical certainty that not only does this fungus cause a rotting of the tuber but that it is also responsible for a disease of the potato plant as a whole, this disease being of the "wilt" type, although the fungus does not primarily invade the vascular system as appears to be the case with the Fusarium and Verticillium wilts.

It remained, however, to be proved experimentally that the symptoms characteristic of this wilt could be produced by the inoculation of the fungus from pure cultures into the plant, and this was done during the past season.

The potato plants used in the experiment were raised in pots in a cool greenhouse, from healthy tubers, each having a good stout terminal sprout; and the remaining eyes, which might have given rise to other shoots above ground, were cut out before planting. This was done in order to have a single substantial stalk in each case which was to be inoculated. The soil used was not sterilised, but was virgin loam, from which the fungus was practically certain to be absent.

The plants were allowed to grow until they were about 45 cm. high, their tips were twice pinched, owing to the tendency of the plants to become "drawn" (etiolated) and thus they did not become too weak and lanky. There were five plants in all which, by 14th July, were of approximately equal vigour and growth. On this date incisions were made, under as aseptic conditions as possible, in the stalk of each plant, below the surface of the soil, and into the wounds thus made in three instances small portions of a pure culture of *Phytophthora erythroseptica* were introduced, while nothing was introduced in the two other cases. The wounds were then wrapped round with tinfoil, and the soil around the stalks, which had been removed, was replaced.

Within four days it was noticed that the large lower leaves of the three inoculated plants had turned a bright-yellow colour and some of them had fallen off. Several of the leaves on the upper parts of these three plants also were becoming pale green, while in the two non-inoculated plants there were no abnormal symptoms whatever.

Eleven days later these abnormal symptoms in the inoculated plants were more strongly marked, while, in one case, all the larger lower leaves, as well as the lateral shoots in their axils, were begin-

Fig. 5. Pink Rot Wilt. The diseased plant on the left was inoculated with *Phytophthora erythroseptica*, the healthy one on the right was not inoculated. *See p.* 511.

INVESTIGATIONS ON POTATO DISEASES.

Fig. 6.—Portion of the surface of a potato tuber affected with Silver Scurf showing slightly depressed areas of the skin in one of which (A) minute black sclerotia are visible. (Considerably enlarged.) *See p.* 518.

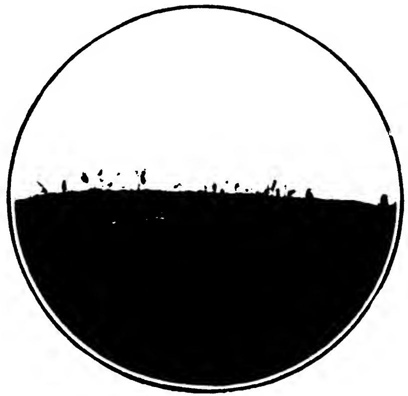


Fig. 7.—The spore-bearing tufts of the Silver Scurf fungus, as seen growing from the skin on the edge of a slice of a potato tuber. (Considerably magnified.) *See p.* 518.

Fig. 8.—The club-shaped, several-celled spores of the Silver Scurf fungus, ***Spondylocladium atrovirens*** **Hartz.** (Considerably magnified.) *See p.* 518.

ning to wilt and become flaccid. By 24th August this plant had become completely wilted, the leaves were practically all dead and brown. The stalk for some distance above the level of the soil was blackened, shrivelled, and apparently dead. The two other inoculated plants showed the same appearances on their stalks, their leaves, from below upwards, were becoming brown and dead, while the tops of the stalks were still fairly normal. During this time the two control plants behaved normally and showed no symptoms of disease. A photograph taken on 8th August and reproduced in Fig. 5, shows the contrast between the inoculated, diseased, and wilting plant, on the left, and the healthy control plant, on the right.

The plants were allowed to remain until they were all quite dead, when they were removed from their pots and subjected to microscopical examination. The fungus was found, with its characteristic spores, in the inoculated plants, but was absent from the controls. There is thus no doubt but that this fungus is capable of producing a type of wilt disease of the potato plant, and it is probable that in the field infection occurs from the germinating oospores in the soil, the germ tubes probably entering the roots, rhizomes or stalks of the plants, provided the latter are not protected by a superficial layer of cork cells.

Up to the time of publication of previous reports on this fungus it was only known to occur in Ireland, although it was stated that it probably occurred and would be found when looked for in other countries where potatoes were extensively grown. In the autumn of last year I was, therefore, not surprised to be informed by the the Assistant Director of the Central Bureau for the distribution of of cultures of fungi in Amsterdam that the fungus had been isolated from potatoes in Holland by Mr. van Luyk, working in that laboratory.

The cytological work on the details of fertilisation in this fungus, undertaken by my former assistant, Mr. Paul A. Murphy, which has been in progress for some time, has now been brought to a definite and successful conclusion. A preliminary note on the results obtained has already been published,* and the publication of the full illustrated account is being awaited with interest.

With regard to the allied species described by Coleman as *Phytophthora omnivora* var. *Arecae* it appears, from communications received from Mr. J. Rosenbaum, who has been working with it in Prof. Whetzel's laboratory, in Cornell University, U.S.A., that my surmise that the reproductive organs in this species would be found to follow a course of development similar to that in *P. erythroseptica* was correct.

* *Annals of Botany*, Vol. xxviii., No. 112, Oct., 1914, p. 375.

IV.—"Corky" or "Powdery" Scab.

(*Spongospora subterranea*, Johns.)

The investigations of previous years had shown that none of the several varieties of potatoes grown at Clifden could be regarded as resistant to this form of scab. Although the scab exists in many countries other than the British Isles (probably in all countries in which potatoes have been grown extensively for any considerable length of time) it does not appear to be so prevalent in some of them as it is in certain districts of the West of Ireland, where the climate is a particularly moist one, the land poor, and where farming conditions are very abnormal. Of course in many parts of Great Britain and Ireland the scab is of such minor practical importance that it passes unnoticed by the farmer. But in Denmark and in Holland the scab appears to be of such rare and local occurrence as to have taxed the energies of the phytopathological experts of those countries to discover it in them at all. In the United States, too, it is only by the recent exertions of specialists that this form of scab has been found in that country. The explanation of this comparative absence of the scab is probably to be sought for partly in climatic or soil conditions and partly in the up-to-date methods of farming in vogue, particularly as regards suitable rotation of crops.

Nevertheless, it was thought that its non-prevalence in foreign countries might possibly be due to resistance to the scab on the part of the varieties of potatoes used. Owing to the kind assistance of Dr. Ritzema Bos, Director of the Phytopathological Service in Holland, a supply of three varieties of Dutch seed potatoes (Eigenheimers, Red Star, and Zeeuwsche Blauwen) was obtained. In addition to these a few tubers of two unnamed varieties from the United States were also procured.

These foreign seed-tubers were planted at Clifden, in 1914, in land which had been cropped continuously with potatoes for five years previously and was known to be seriously infested not only with the organism causing "Powdery Scab" but also with that causing "Pink Rot."

When the crop was lifted in the Autumn it was found that the tubers of all the varieties were affected with both Spongospora and with "Pink Rot." The Dutch Red Star was not so badly affected as the other varieties, but it cannot be regarded as really resistant.

The newer varieties, Arran Chief, Arran's Hope, and Summit were tested in the same way and found to become attacked both with "Powdery Scab" and "Pink Rot," Summit being perhaps rather less diseased than the other two. There was indeed little to choose between the amount of attack on any of the varieties mentioned

and that on Champion, Irish, Queen and Duchess of Cornwall, grown in adjoining plots on similar land.

A single small experiment was carried out on soil treatment for this disease, the land being wetted with petrol (as used in motor-cars) and subsequently planted with tubers not affected with "Powdery Scab." As a result of planting the tubers too soon after the application of the petrol the first lot of them was completely killed. After waiting for a considerable interval to allow of the evaporation of the petrol a further lot of similar tubers was planted. These produced plants, but the tubers resulting from them were not free from "Powdery Scab." Petrol, therefore, is not a promising soil disinfecting agent as far as this disease is concerned.

V.—"Black Speck" Scab and "Collar Fungus."

(*Hypochnus Solani* Prill. et Del.)

This form of scab was described and illustrated in the second of the present series of reports.* It is characterised by the presence on the surface of the tuber of very dark, almost black, bodies of irregular shape and varying size which are compacted masses of spawn or mycelium—that is *sclerotia*—of a fungus known formerly as *Rhizoctonia Solani* Kühn. These sclerotia do not adhere very firmly to the skin of the tuber and can easily be detached with the finger-nail, leaving a scarcely perceptible mark, for the fungus hyphae penetrate only into a few of the outermost layers of the cells of the skin. On freshly-lifted tubers these sclerotia are frequently white on the surface, but they ultimately darken. Running over the surface of affected tubers and proceeding from and to these sclerotia the ordinary threads or hyphae of the fungus in question can usually be discerned, especially if a good pocket-lens be employed. These threads are brown in colour, both when seen with the naked eye and with the microscope, and have no tinge of violet in them.

About ten years ago F. M. Rolfs, in the United States, showed,† by studies with pure cultures derived from spores, that *Rhizoctonia Solani* was nothing but the sterile form of a basidiomycetous fungus, to which the name *Corticium vagum* var. *Solani* was given, and which, there appears now to be little doubt, is identical with the "Collar Fungus" *Hypochnus Solani*, described by Prillieux and Delacroix. This "Collar Fungus," which forms a whitish felt of spawn, bearing spores, around the bases of potato stalks, is not

* Journal, Dep. Ag. and Tech. Inst. for Ireland, Vol. XI., No. 3, April, 1911, p. 444.

† Bull. 91, Agric. Expt. Station, Colorado Agric. College, June, 1904.

uncommon in Ireland and in some seasons recently it has been quite abundant in some of the plots at Clifden.

As was stated in the report above referred to, a number of attempts were made at Clifden, in 1910, to obtain cultures of *Rhizoctonia Solani* from the spores of the "Collar Fungus" and to confirm, if possible, Rolfs' work. Success did not attend these efforts, for, although the spores could be got to germinate, they refused to do more than develop short germ tubes. The identity of the two fungi was, however, successfully established at that time in another fashion, namely, by tracing under the microscope an absolutely unbroken connection between individual spore-bearing hyphae of the "Collar Fungus" and the sclerotia of Rhizoctonia on the surface of a tuber.

Further evidence of the identity of the two fungi was published by Riehm* in the following year, who obtained from isolated portions of the mycelium of the "Collar Fungus" cultures of *Rhizoctonia Solani.*

Notwithstanding this it was felt that a repetition of the work of Rolfs, involving as it did the use of the basidiospore of the "Collar Fungus" as a starting-point, would be of value. Accordingly, in 1914, in view of a good supply of the "Collar Fungus" being available at the Clifden Station, opportunity was taken to repeat and extend the trials made in 1910.

The spores were allowed to fall by gravity on to the surface of set plates (Petri dishes) of various media, and on several of these they germinated as in the previous trials. In some cases development did not proceed beyond the production of comparatively short germ-tubes, whilst in others the spores gave rise to mycelium. By removing the latter to suitable media in test tubes at still comparatively early stages of growth pure cultures were obtained. It was noted that when the number of spores falling on the plates was very considerable they did not go beyond the production of short germ-tubes, but that when they were few in number they developed further and produced mycelium. It seems probable that when the number of spores on the plate was very large the failure to do more than produce germ tubes was simply due to the exhaustion of the nutrient material of the medium, but that when the number of spores was small sufficient food was available for further growth and the production of mycelium.

From spores which germinated and produced mycelium on plates of ordinary beef-extract gelatine pure cultures were obtained and growth and development on various media studied. Pure cultures of the Rhizoctonia form of the fungus were obtained without difficulty from sclerotia on tubers. These were carefully washed and placed in a moist atmosphere, when fresh aerial hyphae developed

* Mitt. a. d. K. Biol. Anst. f. Land-u. Forstwirtschaft. Heft 11, 1911, p. 23.

from the sclerotia. Portions of the fresh growth were removed to suitable media and in some cases pure growths were obtained, while in others bacteria were also present along with the fungus.

An extended series of comparative cultures was carried out on various media of the fungus obtained in pure culture from the spores and that obtained from the sclerotia, and no differences could be established between them. Rolfs' work has, therefore, been fully confirmed, and it may be regarded as certain that the "Collar Fungus," *Hypochnus Solani* Prill. and Del., is identical with *Rhizoctonia Solani* Kühn, and the latter name should, therefore, be discarded.

In this connection it is interesting to note that studies on Rhizoctonia have also been made in India by Shaw* who describes two forms. One of these, found attacking jute, cotton, ground-nut, and cow-pea, and not associated apparently with any basidiomycetous fructification, he considers to be identical with *R. Solani* Kühn. The other form, which bore large sclerotia and differed from the first in other respects, was found on ground-nut, cow pea, and also on *Trichosanthes*, and associated with it in all three cases was a form of fructification with basidiospores comparable with the "Collar Fungus" on the potato. It was concluded that this fructification was that of the fungus producing the sclerotia from cultures for which "*a scraping of the basidia*" (not the actual basidiospore) served as a starting-point.

With regard to the damage done to tubers by *Hypochnus Solani* this cannot be looked upon on the whole as very serious. All attempts to cause a wet rot of the tuber with it failed, although some authors maintain that a rot of this kind is caused by the fungus. When dealing with this fungus in the report previously mentioned it was stated that it might prove harmful to the young sprouts of potato tubers when in the ground, and might be a cause of "misses." An illustration of a probable case of this kind was given. In regard to this matter experiments were made last year with pure cultures which show conclusively that the fungus is capable of killing off developing sprouts in this way when inoculated from pure cultures, while the shoots of control tubers placed under similar conditions, but not inoculated, remained healthy.

Up to the present it has not been found possible to get the fungus in artificial cultures (whether from spores or from sclerotia) to develop its fructifying stage and produce its basidiospores, but an interesting observation was made of an unusual development of this stage on tubers after they had been dug. The "Collar Fungus" was somewhat abundant on the stalks of the varieties Langworthy, Golden Wonder, What's Wanted, and Peacemaker. These varieties

* Shaw, F. J. F., : "The Morphology and Parasitism of Rhizoctonia," Mem. Dept. of Agric. in India. Bot. Series, Vol. 4, No. 6, Sept, 1912, p. 115.

were unsprayed and quickly succumbed to the ordinary blight. The tubers were dug comparatively early and a quantity of them of seed size were placed in shallow sprouting boxes in the ordinary way. After a short time the surfaces of those tubers in the boxes which were in the topmost layer and were exposed to air and light became covered apparently with a white powder, as if they had received a light dusting of lime or flour. Microscopic examination, however, showed that this white material consisted of the fructification and spores of *Hypochnus Solani*.

In the United States* of America recent work seems to show that this fungus is by no means so comparatively harmless as has frequently been believed, for it seems that by attacking the roots and other underground parts of the growing plants the fungus may be responsible not only for "misses" but also for causing a depression in yield. Whether a similar state of affairs exists under other climatic conditions, such as prevail in Ireland, is not yet known.

A considerable amount of confusion appears to exist in the literature as to the status of *Hypochnus Solani* Prill. et Del. (=*Rhizoctonia Solani* Kühn), several authors including it under *Rhizoctonia violacea* Tul. This is done, to take one instance only, by Güssow† in a report on a case of Rhizoctonia affecting potatoes in the east of England. It is not possible to say with certainty from the description given whether *Rhizoctonia violacea* was present or whether it was a case of Hypochnus attack. On the whole it would appear to have been a case of *R. violacea*, but no really satisfactory evidence is brought forward to show that *R. Solani* Kühn is identical with *R. violacea* Tul., and the assumption that this is so appears to be quite unwarranted. On the other hand, Lindau‡ appears to be in error when he states that Rolfs considers *R. Solani* to be identical with *R. violacea*. As a result of Rolfs' work (which has now been so fully confirmed) it is more than ever clear that Kühn was quite right in establishing the species *R. Solani* and separating it from *R. violacea* Tul.

Of course *R. violacea* Tul. may be an "aggregate" species, and further light can only be thrown on the matter by careful studies of pure cultures of the fungi which have been included under that name. So far as Ireland, however, is concerned there are two quite distinct diseases of the potato due to Rhizoctonia. The first is that called here "Black Speck" Scab, and due to *Hypochnus Solani* Prill. et Del. The second is of an essentially different character, and has been provisionally supposed to be due to *Rhizoctonia violacea* Tul., the fructification of which is as yet unknown.

* W. J. Morse and M. Shapovalov, "The Rhizoctonia Disease of Potatoes." Bull. 230, Maine Agricultural Expt. Station, Aug., 1914.

† *Journal*, Roy. Agric. Soc., England, Vol. lxvi., 1905, p. 173; and *Zeitschr. f. Pflanzenkrankheiten*, Vol. xvi., 1907, p. 135.

‡ *Handbuch der Pflanzenkrankheiten* (Sorauer) 3 Aufl. Bd. 2, 1908, p. 472.

This latter disease is known in some parts of Ireland as "moss burning," and apparently the same disease is known in England as "coppery-web." The fungus causing it differs slightly in colour from *Hypochnus Solani*, as well as in some other minor points, but what is more important, actually causes the partial or total destruction of the tuber. This is due to the fact that it produces certain structures—the so-called *corps miliaires* of Tulasne—which are not sclerotia, but which penetrate the skin of the tuber and give rise within it to radiating groups of hyphae through which food materials are abstracted and the fungus thereby nourished. This fungus is not nearly so common on potatoes in Ireland as *Hypochnus Solani*, and although some unsuccessful attempts have been made during recent years to obtain it in pure culture, prosecution of further research in the matter has been prevented by the lack of material with which to work.

Some preliminary culture studies were made during the season on an undetermined species of Rhizoctonia found associated with the roots of young flax plants suffering from yellowing. The species differs certainly from *Hypochnus Solani*, and though in some respects it resembles *R. violacea* it may yet be found not to be this species. A few experiments designed to ascertain whether it might be the cause of yellowing in flax gave only negative results.

VI.—"Dry Scab" or "Silver Scurf."

(*Spondylocladium atrovirens* Hartz.)

This is not a serious disease in Ireland or, perhaps, elsewhere, and by the practical farmer would probably be looked upon with no concern, or regarded merely as of interest to the botanical specialist. It is no new disease, having been known at any rate to the phytopathologists of Europe for over forty years. Quite recently considerable interest has been aroused concerning it amongst scientific workers in the United States of America,* and, therefore, a brief description of it and of some experimental work which was carried out during the past season with the fungus which causes it may be given here.

* W. A. Orton, of the U.S.A. Department of Agriculture, has recently characterised it (in Farmers' Bulletin 544, issued in 1913) as a new disease which has recently been introduced from Europe into the United States and is spreading rapidly in the Eastern States. It may easily be the case, however, especially with a disease of such minor economic importance as the present one appears to be, that a "new disease" is merely a newly-*discovered* disease. P. J. O'Gara (*Science*, Vol. xli., No. 1047, Jan., 1915, p. 131) reports its presence in Utah and states his belief that its distribution is widespread, particularly in Utah and Idaho.

Nature of the Scab.

The disease or blemish, as it might often be called, appears in its early stages on the tuber in the form of very slightly depressed and slightly discoloured areas of the skin. Close inspection will reveal the fact that dotted over these areas are numbers of minute black spots, only just visible to the naked eye, but clearly to be seen with the aid of a good lens. Two such areas are illustrated, considerably enlarged, in the accompanying Fig. 6, and on the area to the right the black spots can be seen distinctly. These black spots are, however, not necessarily always confined to depressed areas, for they may also be found on the general surface of the tuber, apart from them. These spots are in reality minute masses of compacted, dark fungus spawn (*sclerotia*) each occupying, as a rule, the cavity of a single cell of the skin of the tuber. When placed under suitable conditions these sclerotia produce tufts of erect, stiff, brown threads or hyphae, upon which club-shaped, thick-walled, several-celled, dark-coloured spores are developed, being arranged thereon in the form of rings or "whorls." These spore-bearing tufts, as seen on the edge of a slice of a potato tuber, are illustrated in Fig. 7. These spores, of course, serve for the propagation of the fungus, and a photograph of a few of them is given in Fig. 8.

When tubers have been lifted and stored for some time the affected areas often become rather more conspicuous and frequently take on a whitish or silvery appearance, which is particularly well marked if the tubers are exposed to light after lifting and thus allowed to become green. In what may, perhaps, be termed severe cases the skin of affected areas may become somewhat dry and hard and the outer layers of it may even begin to flake off. Cracks or wrinkles in the skin may also sometimes occur and very badly affected tubers may even become somewhat prematurely shrivelled owing to loss of water.

It was believed by Frank that this fungus was capable of causing a rot in the tuber and thus of destroying it, but subsequent examination of Frank's material by Appel and Laubert led them to the view that the decay, certainly present in the tubers investigated by Frank, was more probably due to the blight fungus than to Spondylocladium. Moreover, these two authors came to the conclusion, as a result of experimental work, that Spondylocladium is not capable of producing a rot in potato tubers, and that it had little significance as a disease-producing organism. Johnson,. who first recorded the presence of this fungus on the potato in Ireland, in 1903, expressed the view that the fungus is a true parasite and may apparently do considerable damage, not only as a producer of scab but also by giving rise in a more advanced stage of attack to a rot of the tuber. My own observations, however, extending over

some years, lead me rather to accept the views of Appel and Laubert recorded above.

Since the question as to the production or otherwise of a definite tuber-rot by this fungus is capable of experimental solution it was considered desirable to attempt to settle the point; and in view of Appel and Laubert's previous work a negative result seemed probable. Pure cultures of the fungus were obtained, without difficulty, from single spores, and a large amount of detailed information as to the behaviour of the fungus, when growing on about a dozen different media, was accumulated which, however, cannot be discussed here. All attempts to produce a rot in detached potato tubers by inoculations with the fungus, whether made merely superficially on the undamaged skin or at freshly-cut wounds, gave entirely negative results, and the fungus did not even attack the cells of the skin of these tubers much less pierce it, although some very slight growth was made in a few of the cells destroyed where wounds were made. Nor did any attack, much less rot, result, when healthy, living potato stalks or very young healthy sprouts on unplanted tubers were inoculated by similar methods. The idea that this fungus causes a potato rot is, therefore, untenable, although, of course, it must be admitted that in cases where the skin becomes flaked off or cracked its function in resisting the attacks of other definitely parasitic organisms may be impaired.

On the other hand it was found possible to reproduce the scab, but not to cause a rot, by inoculation of young tubers still attached to the parent plants in the field. For this purpose the soil around the bases of three growing plants of the variety "Summit" was removed and the young tubers were thus exposed, care being taken not to injure their skins. At this stage the tubers ranged in size from that of a pea to that of a hen's egg, and were free from the fungus. Their surfaces were carefully washed with water previously well boiled and allowed to cool in a plugged flask. A portion of a suspension in sterile water of spores of Spondylocladium, derived from a 12 days old pure culture on potato gelatine, was poured over each tuber, in the case of one of the plants, while to the uninjured surface of each of the tubers of the second plant a small portion of the culture itself—including both mycelium and spores—was applied. To the tubers of the third plant, which served as a control, nothing was applied. The soil was then carefully replaced and the plants allowed to continue their growth undisturbed for just over two months.

When dug, the tubers were subjected to careful examination (both naked eye and microscopical) for the presence of the fungus. In the case of the plant where spores alone were used as the inoculating material it was found to be present on ten out of the twelve tubers. In the second case, where spores and mycelium were

used, it was found on eight out of eleven tubers. The control plant produced ten tubers, on no one of which could any traces of Spondylocladium be found.

Comparison of the positive results obtained in this experiment with the negative ones obtained when the attempt was made to get the fungus to attack the skins of healthy young tubers, removed from their parent plants, strongly suggests that infection may only occur while the tuber is still growing. It may be that the fungus first gets its foothold on the outer, dead, exfoliating cells of the growing periderm or skin and cannot do so when further growth of the skin is stopped.

Perhaps the most serious charge which has so far been made against this fungus (apart from the disproved one of causing a tuber rot) has recently been formulated by Millard,* who assigns it as a cause of " blindness " in seed tubers, that is of destroying the buds in the eyes of the potato, so that affected tubers, when planted, fail to grow. It must be confessed, however, that the evidence adduced in favour of this assumption is by no means convincing, being purely circumstantial. Unfortunately, this short paper did not come under notice last year until it was too late for any experimental work to be undertaken on the point raised, but it is hoped to devote some attention to this new rôle which has been assigned to Spondylocladium during the coming season. For the present, therefore, and until further substantial evidence is adduced of the real seriousness of the attacks of this fungus on the potato we may continue to regard " Dry Scab " or " Silver Scurf " as being a disease of but little economic importance.

VII.—" Ordinary " or " Brown " Scab.

A few tubers affected with this well-known trouble are illustrated in Fig. 9. The causes to which Brown Scab have been ascribed are many and various, but it is somewhat remarkable that the scientific study of the cause of the disease has, in Europe at least, almost entirely been neglected. This may possibly be due to the relative unimportance of the disease as compared with blight and the various forms of tuber rot, although in severe cases of attack there is no doubt that the market value of a scabby crop of potatoes may be seriously reduced, and it has been proved that if seriously scabbed tubers are used as "seed" a diminished yield is obtained.

It is not known with certainty whether what usually passes as brown scab is in reality one disease or more than one. It is certain that the spot form of Spongospora scab is frequently confused with brown scab. The disfigurement of the skin of the tuber is not constant in its character, as a comparison of the scab spots illus-

* W. A. Millard, "Blindness in Potatoes," *Journal of the N. of England Horticultural Society*, No. 37, April, 1914, p. 106.

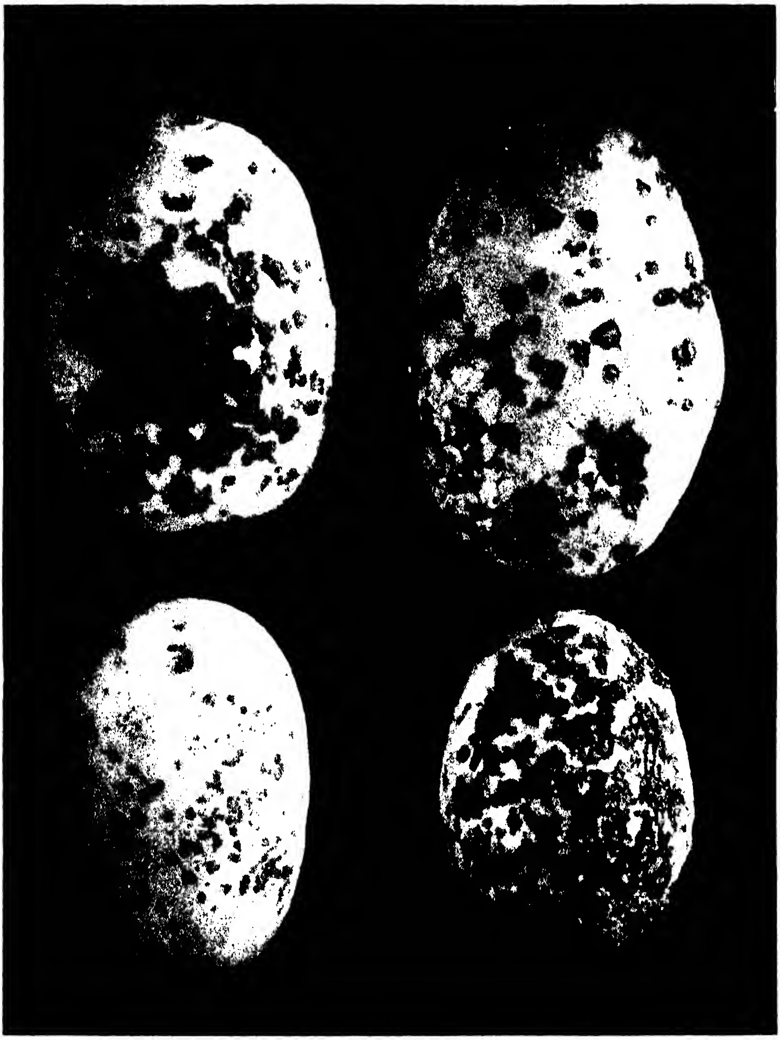


Fig. 9.—Four potato tubers affected in varying degrees with ordinary or brown scab. *See p. 520.*

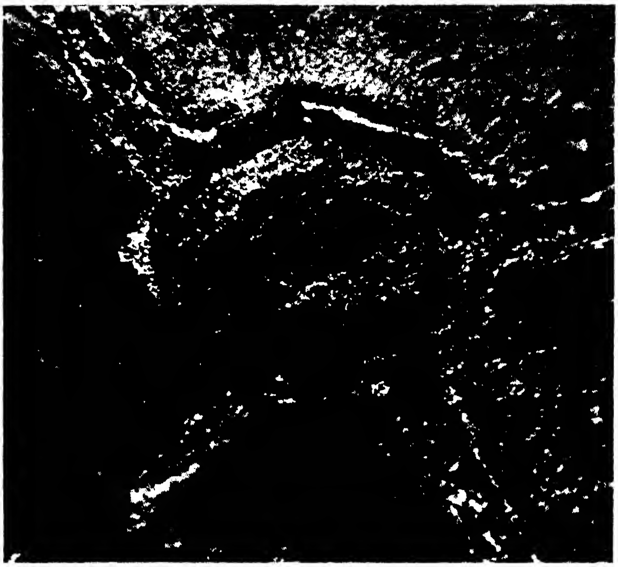


Fig. 10.—A single spot of ordinary or brown scab. (Considerably magnified.) *See p.* 521.

Fig. 11.—Two other spots of ordinary or brown scab of a somewhat different character from that in Fig. 10. (Considerably magnified.) *See p.* 521.

trated in Figs. 10 and 11 will show, and a careful comparative study of the various kinds of scab spots occurring on potato tubers is a great desideratum.

Supposed causes of Brown Scab.

A few of the popularly current ideas with regard to this form of scab, some of which are doubtless correct, are as follows. Scabby potatoes are usually good cooking potatoes. Their production is favoured by lightness of soil, dryness of season, and by the addition of lime, marl, or ashes to the soil as well as by the use of fresh stable manure and night-soil as fertilisers. Many people believe that scabbiness is caused in potato tubers by the mechanical irritation of their skins produced during growth by the presence of lime-rubble, cinders, sharp sand, and other such materials in the soil, while attacks of scab have also been attributed to the agency of insects, such as millipedes, as well as to those of bacteria and fungi.

In the United States a form of scab is prevalent, illustrated in Fig. 12,* which strongly resembles our brown scab in many respects. It has been proved definitely that this American scab is caused by a micro-organism named, in 1881, by its discoverer, Thaxter, *Oospora scabies,* which is now believed to be identical with Gasperini's *Actinomyces chromogenus.* It is extremely likely that this organism is also present and is the cause of much of the brown scab in Europe, but although some writers have gone so far as definitely to ascribe some of our scab to this organism no scientific evidence appears yet to have been published proving that the said organism is really responsible for our ordinary potato scab.

That some of our ordinary scab at any rate is due to the attacks of micro-organisms seems clear from an experiment made at the University of Leeds by Stewart.† Briefly put, the experiment consisted in planting healthy potato tubers, previously disinfected with formalin, in soil from a field in which the cultivation of potatoes had had to be abandoned owing to its tendency to produce excessively scabby crops. On the one hand the soil was used untreated and on the other it was sterilised by steam-heat before the tubers were planted. The result was that every tuber produced from the plants in the untreated soil was scabbed to a greater or less degree, while every tuber in the sterilised soil was absolutely free from any trace of scab. No attempt appears to have been made, however, to follow the matter further and isolate the organism and study it.

During the time that the work on potato diseases has been in progress at Clifden there has been very little opportunity for study-

* The tubers illustrated were kindly supplied through Mr. W. A. Oriton of the U.S.A. Department of Agriculture.

† J. G. Stewart, "A Report on Experiments with Potatoes," Univ. of Leeds and Yorks. Council for Agric. Education, No. 70, 1908, p. 15.

ing this disease. Although ordinary scab is not entirely absent there it is by no means prevalent, and the soil, being chiefly reclaimed bog, appears to be unfavourable to it. Even when tubers seriously affected with scab have purposely been used for seed at Clifden the resulting crop has been practically free from scab. The scabs on such examples of the disease as have been examined there show, when the tuber is first lifted, a somewhat evanescent slight white growth on the surface. Cultures have been made from such scab spots and an organism obtained, which although apparently a species of Actinomyces and resembling the American species to some extent morphologically and, in some other characters, such, for example, as by producing a deep brown stain in the culture medium, yet does not appear to be identical with it. Experimental trials to produce scab on potatoes grown at Clifden, by inoculation with this organism have not yet given decisive results. It is only fair to add that only doubtful results were obtained when a culture of the American species (kindly supplied by Dr. Melhus of the United States Department of Agriculture) was used. Apparently the climatic or soil conditions at Clifden are not favourable to the development of this organism.

Scab not due to mechanical irritation.

With regard to the question as to whether scab is produced by mechanical means—evidence indicating that the answer is in the negative has been obtained. An experiment was undertaken at my suggestion by Mr. R. J. Fannin, as a piece of fourth year student's research work at the Royal College of Science, Dublin. Its main object was to ascertain whether, in the absence of micro-organisms, healthy, scab-free potatoes would produce a scabby crop, when planted in soils purposely made mechanically irritating. It was also designed to test the accuracy of Stewart's results, mentioned above. The plants were grown in very large ordinary porous pots, there being thirty of them in all. In one half of them the soil was sterilised by autoclaving at 50 lbs. pressure, for a period of one hour, on each of two successive days. The seed tubers used were quite free from visible scab spots and they were disinfected before use by steeping for two hours in dilute formaldehyde solution ($\frac{1}{2}$ pint commercial 40 per cent. formalin to 15 gallons of water). As, however, the tubers had terminal sprouts these were not submerged in the disinfecting solution. The types of soil used were (1) ordinary soil not definitely known to produce scab, (2) soil from a field which had produced scabby tubers, (3) ordinary soil to which peelings from scabby tubers were added, (4) an artificial soil made up chiefly of builder's rubble with a little of No. 2 soil, (5) an artificial soil composed mainly of cinders with a little of No. 2 soil. The last two types of soil were about as mechani-

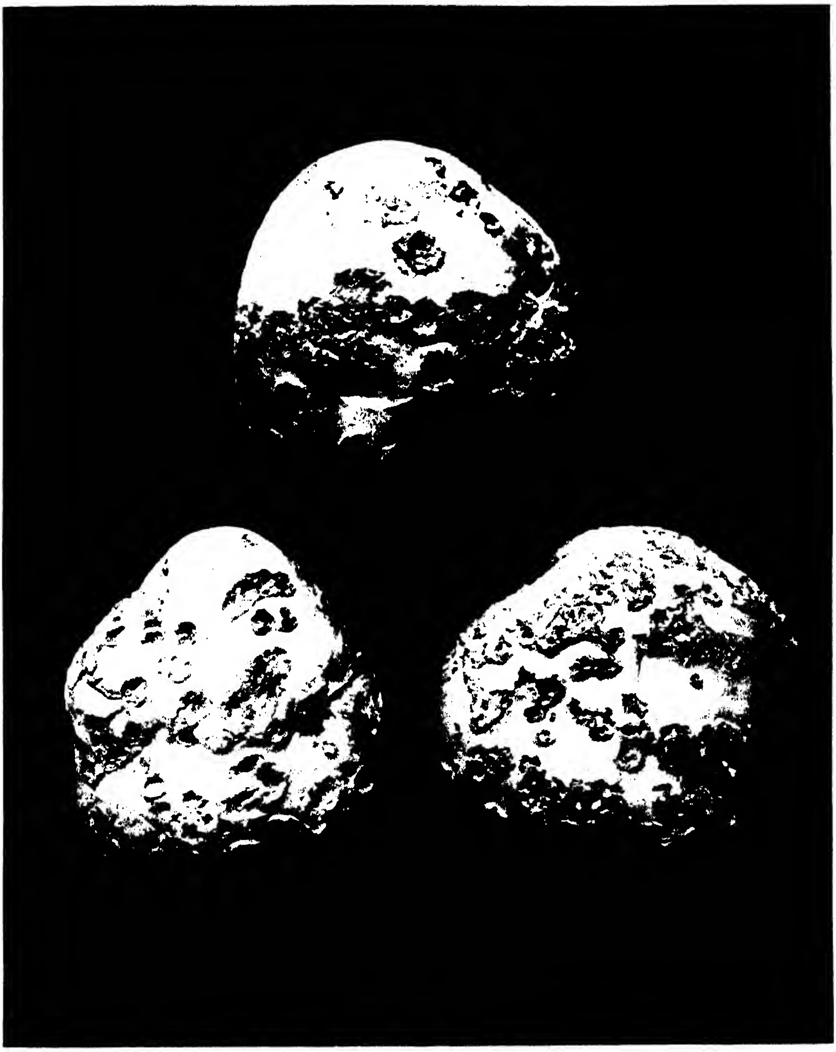


Fig. 12.—Three tubers affected with ordinary scab of the American type, caused by Thaxter's *Oospora scabies*. *See p.* 521.

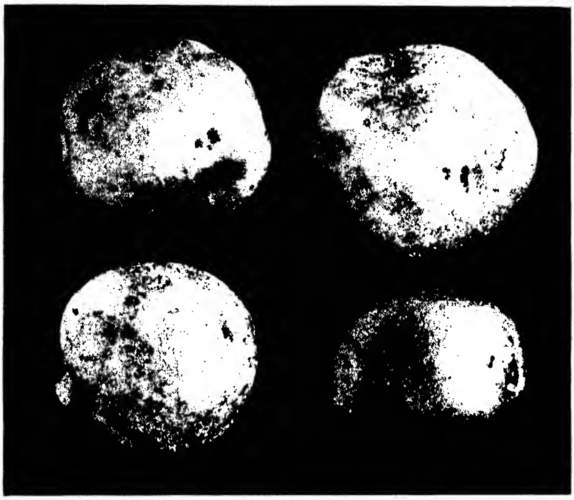


Fig. 13.—Tubers free from scab grown in soil made mechanically irritating by the addition of cinders, and subsequently sterilised. *See p. 523.*

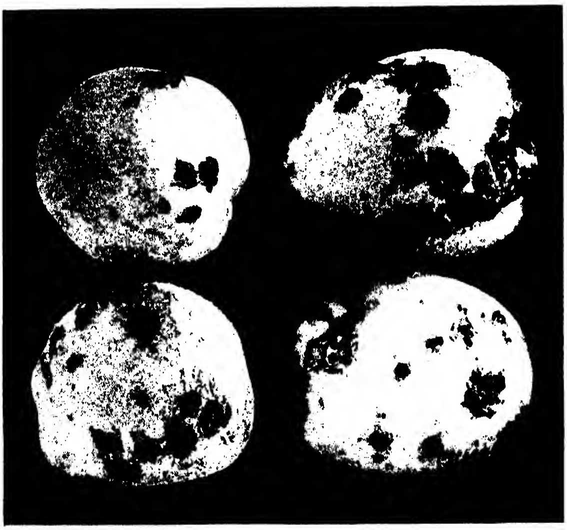


Fig. 14.—Scabby tubers grown in a similar soil to the above but not sterilised. *See p. 523.*

cally irritating as it would be possible to make them. There were six pots of each type of soil, three being untreated and three being sterilised in each case, as already mentioned. The results are summarised in the following table :—

Type of soil used.	Untreated.		Sterilised.	
	Total No. of Tubers.	No. of Scabby Tubers.	Total No. of Tubers.	No. of Scabby Tubers.
Ordinary Soil not definitely known to be scab producing	7	4	8	0
	9	6	6	0
	12	8	8	0
Soil from a field which had produced Scabby Tubers	15	15	7	0
	15	15	4	0
	15	14	7	0
Ordinary soil supplied with peelings of Scabby Tubers	19	15	9	0
	10	6	7	0
	9	7	11	0
Scab-producing Soil supplied with builder's rubble	9	9	6	0
	11	10	12	0
	12	9	7	1
Scab-producing Soil supplied with cinders	13	11	14	0
	9	9	11	0
	7	7	15	2

It will be seen that scabby tubers were obtained in every case in the untreated soils, whilst they were absent in the sterilised soils, except in two cases out of the fifteen, and the results show that 84 per cent. of the tubers in the untreated soils were scabby as against 2 per cent. in the sterilised soils. There is thus practically no doubt but that this form of scab must be due to an organism which can be killed by heat.

In the case of four plants out of the six planted in mechanically irritating soils no scabby tubers were produced (compare Figs. 13

and 14), when these soils were sterilised, and in the other two cases there were only three scabby tubers out of twenty-two. The form of scab on these three tubers was exactly similar to that present on the tubers from the untreated soils and was doubtless also due to the same organism and not to mechanical means. It is probable that the organism found its way into these two pots by accidental means during the growth of the plants. The pots were kept on the roof of the College, and when the plants grew up it was found impossible, owing to wind, etc., to keep the surface of the soil in them so covered as to exclude all possible contamination from dust, etc.; and, as a matter of fact, during the greater part of the time that the plants were growing the pots were not covered. In any case the presence of these three scabby tubers does not seriously invalidate the conclusion that, judging from this experiment, mechanical irritation is not one of the causes of our ordinary brown scab. An experiment conducted at Kew some time ago,* from the results of which the opposite conclusion was drawn, is not convincing, because the elementary precaution was not taken of excluding the micro-organism factor.

It seems highly probable that the ordinary or brown scab is caused by a micro-organism, very widely distributed in our soils, which is highly sensitive to the action of acids and alkalis. When soil in which the organism is present is naturally alkaline or is made so by the addition of lime, ashes, etc., the development of the organism is favoured and much scab results, but in acid soils or in those rendered so by the use of sulphur or by the decomposition products of wet sawdust the development of the organism is inhibited and the scab reduced or entirely prevented. Cultural studies on the development of the organism in media, the acidity and alkalinity of which can be regulated at will, are eminently desirable.

VIII.—"Skin Spot."

(*Spicaria Solani* Hart.)

A variety of potato scab, perhaps better termed "skin-spot," has been met with in Ireland occasionally, which is illustrated in Fig. 15. It is characterised by the presence on the skin of the tubers of rounded depressed areas, about 2 millimetres in diameter, and having a dark brown colour, with a somewhat lighter coloured, rather well-marked margin. These areas are often isolated from one another, but not infrequently their margins meet and the spots coalesce, as seen in the figure. The central portion of each of these shallow pits is usually somewhat raised. When sections are cut

* *Journal*, Bd. Agric., Vol. 15, No. 10, 1909, p. 749.

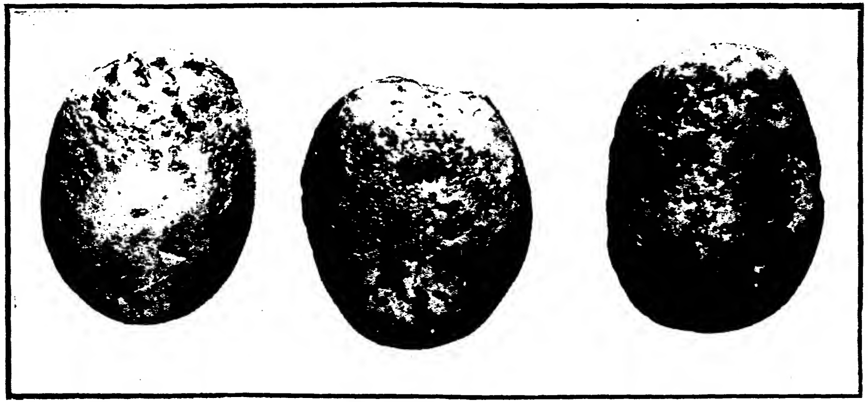


Fig. 15.—Tubers affected with "Skin Spot," probably due to the fungus *Spicaria Solani* Hart. *See p.* 524.

Fig. 16.—A potato stalk cut longitudinally, showing the caterpillar of the Rosy Rustic Moth burrowing in its interior. *See p.* 526.

through these spots it is seen that the flesh of the tuber beneath them is brown and dead, but not to any great depth. In the dead tissues fungus mycelium is found; and on leaving the cut surface of these spots exposed in a moist atmosphere for a short time a strong growth of a fungus, identified as *Spicaria Solani* Hart., develops from them. According to Reinke and Berthold* this fungus is the conidial stage of the ascomycete *Nectria Solani* R. and B., which, they state, is a pure saprophyte. It is to *Nectria Solani* that the "Dry-" or "Winter-Rot" of potatoes (really caused by one or more of the various species of Fusarium) has been persistently but erroneously ascribed in English literature on the subject for a long time past.

No cultures or infection experiments have been made in connection with this "skin-spot," and, therefore, it can only provisionally be regarded as caused by Spicaria. The trouble is an infrequent one and the cases of it so far observed have been of no serious practical importance. The specimens illustrated are extreme examples, and the disease is merely alluded to here because in any attempt to bring clearness and definiteness into the confusion which often exists as to what ordinary or brown scab is, such cases must be eliminated and studied separately.

IX.—Miscellaneous.

Dry Rot.

In addition to the diseases dealt with in the foregoing paragraphs a considerable amount of work has been done, more particularly in connection with "Dry Rot" and with the Verticillium disease. As regards the former this is often of serious import in relation to losses in seed potatoes, particularly of early varieties, and more especially when such potatoes have been improperly handled as, for example, when transported in bags. There is probably more than one form of Dry Rot, but, in all likelihood, the different forms of it are caused by species of fungi all belonging to the genus Fusarium. The differentiation of these species is a very difficult matter and the study of the action of each of them on the potato is a subject which requires a considerable amount of time. Hence, until the investigations on this disease are considerably more advanced it is not considered wise to attempt to present any detailed report.

Verticillium Disease.

The investigations in connection with the Verticillium disease which have been in progress since 1909 were continued during the past season. The particular phase of the subject to which attention was devoted was that of producing the disease in healthy plants by inoculating them with a pure culture of the

* *Die Zersetzung der Kartoffel durch Pilze*, 1879, p. 39.

fungus. In this respect complete success was obtained and it now only remains to be proved that the tubers produced by such artificially inoculated plants give rise to diseased plants, just as the tubers (or some of them) of the naturally diseased plants do. It is hoped to establish this point during the coming season, and at the conclusion of it to publish a detailed account of this comparatively little known disease.

Animal injury.

We are fortunate in this country in that the potato crop is practically free from really serious attacks by insects or other animals. When the plants are young the potato flea-beetle may cause slight injury and, of course, wire-worms and slugs do, at times, cause considerable damage to the tubers. A case has already been mentioned in one of the earlier of these reports where the caterpillar of the Frosted Orange Moth (*Gortyna ochracea*, Hb.) was found destroying potato stalks, causing symptoms which might, on casual observation, be mistaken for those of Black Stalk Rot—a bacterial disease. During 1914 a good many cases of attacks of this kind were again noticed, but the caterpillar in these cases was found to be that of the nearly allied species, *Hydroecia micacea* Esp., the Rosy Rustic Moth. The way in which it burrows out the central portion of a potato stalk is illustrated in Fig. 16, and the hole through which it made its entry is clearly seen.

In addition to those associated with the investigations dealt with in this report whose names have already been given there remain to be mentioned Mr. J. J. O'Conor, who acted as outdoor assistant at Clifden during the season, and Mr. H. A. Lafferty, A.R.C.Sc.I., who has been largely responsible for the laboratory work in connection with Black Speck Scab, Ordinary Scab, Silver Scurf, and Dry Rot. Acknowledgments are due and are cordially tendered to all who have thus co-operated towards the success of the work.

GEORGE H. PETHYBRIDGE.

TOBACCO GROWING IN IRELAND.

THE EXPERIMENTS IN 1914.

*** *An article dealing with the experiments in Tobacco-growing in Ireland, conducted under the auspices of the Department up to the end of the year* 1908, *appeared in the issue of the Department's* JOURNAL *for January,* 1909—*Vol. IX., No.* 2. *Reprints of the article, with illustrations, have been issued in pamphlet form and may be obtained free of charge on application. Further articles, giving particulars of the progress of the experimental work in each of the years* 1909 *to* 1913, *inclusive, appeared in the issues of the* JOURNAL *for January,* 1910 (*Vol. X., No.* 2), *January,* 1911 (*Vol. XI., No.* 2), *April,* 1912 (*Vol. XII., No.* 3), *January,* 1913 (*Vol. XIII., No.* 2) *and January,* 1914 (*Vol. XIV., No.* 2) *respectively. The paper below gives some account of the experiments, conducted in* 1914, *and shows the latest results obtained.*

Method and Scope of Experiments.

The scheme of large scale experiments in the cultivation of tobacco undertaken by the Department in 1904 concluded with the crop of 1913, and it is expected that complete returns regarding this series of experiments will be available for publication in an early issue of this JOURNAL. These remarks also apply to the Small Growers' scheme which was started in 1910 for the purpose of enabling farmers with small areas of land to experiment with tobacco growing. A third scheme of tobacco experiments, covering a period of ten years and financed out of the Development Fund was inaugurated in 1914. This scheme is practically an extension and development on commercial lines of the Small Growers' scheme, with the special object of providing the most efficient means for preparing the farmers' tobacco for market, an operation known as re-handling. The entire responsibility connected with the production and sale of tobacco under the terms of this scheme has been entrusted to three re-handlers, namely, the Earl of Dunraven, K.P., of Adare, Co. Limerick; Col. Sir N. T. Everard, Bart., H.M.L., of Randlestown, Co. Meath, and the Wexford Tobacco Growers' Society, Ltd., of Tagoat, Co. Wexford. The scheme provides in the cases of Lord Dunraven and Sir Nugent Everard—

(1) That the re-handler shall arrange for the cropping by himself and other persons selected by him of an area not exceeding 114 acres in any year, at least three-fourths of which shall be on the land of working farmers.

(2) That the re-handler shall undertake to provide the growers with all necessary instruction and equipment.

(3) That the re-handler shall purchase the growers' crops at a price fixed on a commercial basis as soon as the tobacco is ready to be delivered to him.

(4) That the re-handler shall arrange for the re-handling of all the tobacco produced under the scheme, in accordance with American methods adapted to Irish conditions.

(5) That, subject to compliance with the foregoing and certain other prescribed conditions, including the furnishing of all information required by the Department, a grant at the rate of £25 per acre cropped will be payable to the re-handler.

The experiment at Tagoat is on somewhat similar lines, but is limited to an area not exceeding twenty-five acres in any year.

The number of growers and the total areas cropped in 1914 at the different centres where experiments under the new Re-handling Scheme have been instituted are as follows :—

Re-handler.	Centre.	No. of Growers.	Acres.
Earl of Dunraven, K.P.	Adare, Co. Limerick Mullacrew, King's Co.	57	$89\frac{5}{8}$
Col. Sir N. Everard, Bart.	Randlestown, Co. Meath	70	$113\frac{1}{8}$
Wexford Tobacco Growers' Society.	Tagoat, Co. Wexford	10	$15\frac{1}{4}$

Besides those carrying out tobacco experiments under the supervision of the Department, nine other persons in Ireland were licensed to grow approximately $7\frac{1}{4}$ acres.

Weather.

During April and May the weather was very dry and sunny, which was rather favourable for seed beds but increased the difficulty and expense of preparing the land and of transplanting. Moreover, the dry weather induced a severe frost on the 23rd and 24th of May, which killed numerous transplants and retarded the growth of many plantations in Co. Meath and King's County. The continuation of the drought during June and early July checked growth and thereby retarded maturity. Warm rains in August and September induced a rapid and succulent growth which at that period favoured the development of fungoid diseases. The cool, dry weather which prevailed during the last week of September and throughout October checked the progress of disease and improved the quality of tobacco, but the resulting drop in night temperatures caused a frost on the nights of 20th and 21st September which damaged the crop in Co. Meath. On 14th August a windstorm of unusual violence caused great damage to tobacco at all centres, and in the same month a hailstorm caused considerable damage to several crops in Co. Meath. Each year since the tobacco experiments were started, the date on which frost has terminated the growing season, has, as a rule,

been about the same at all centres, but in 1914 the date was 21st September in Co. Meath, 15th October (the usual date) in Co. Limerick and King's Co., and 27th October in Co. Wexford.

Varieties. The purpose of the new Re-handling Scheme, to prepare a large number of small crops for market as one crop, cannot be efficiently accomplished unless the separate crops are similar and fairly uniform in quality. For this reason it is desirable that only one class, type, and variety of tobacco should be produced. This policy was recognised by the experimenters but not adhered to strictly by them, as sufficient seed of the variety considered most suitable was not available, and, moreover, two of the experimenters did not think that it would be wise, in view of previous results, to discontinue altogether their experiments with cigarette tobacco. As a result, about 211¾ acres were devoted to Copper King, Irish Blue Pryor, Kentucky Black and Red Burley for the production of pipe tobacco, and 6½ acres were cropped with Irish Gold, Samos and Giourkioi for the production of cigarette tobacco. In addition to the seven varieties which were grown on a commercial scale, tests were conducted on a small scale with nine varieties, hybrids and selections of seed. The results of experiments with varieties were as follows :—

For Roll and Plug.—Copper King was the variety most generally planted and proved the most suitable one for the purpose, though Kentucky Black, which was grown to a limited extent at one centre, gave particularly good results in one field. Irish Blue Pryor was inferior in every respect except mere size, and should not be grown when seed of either Copper King or Kentucky Black is obtainable.

Brown Wrappers for Roll and Plug.—Two acres of Broadleaf Burley were grown at one centre for this purpose, but it produced a class of leaf more suitable for cutting than for wrapper purposes.

Cigarette Tobacco of the Virginia type was produced with comparative ease and economy at one centre on an area of 4½ acres planted with the Irish Gold variety. Cigarette tobacco of the Turkish type was produced from Samos and Giourkioi varieties, which were grown at one centre to the extent of one acre of each variety. The results were less successful than in previous years. None of the varieties grown experimentally were superior to those grown commercially.

Shelter. When selecting growers under the new scheme of experiments the experimenters found it necessary in some cases to enter into arrangements with farmers whose land had not sufficient natural shelter for tobacco-growing. As a result, herbaceous shelter belts were necessary in the case of many fields under tobacco in 1914, and the rather general failure to provide sufficient artificial shelter was the cause of great damage to the quality of the crop by the severe wind of

14th August. Some fields, indeed, proved to be so exposed that it is doubtful whether even a liberal use of shelter belts would safeguard the tobacco from injury by wind. The experimenters had decided to plant Jerusalem artichokes for shelter purposes, but in two cases " seed " had to be procured from a distance, and in another case the " seed " grown by the experimenter rotted through lack of care in storing. The latter experimenter was, therefore, unable to provide any artificial shelter for his growers' plots, and the others made such a late and unfavourable start owing to delay and drought that the artichokes made an efficient shelter belt in only a few instances. It was, however, quite evident that artichokes are a suitable shelter plant for tobacco if given proper attention. If the roots cannot be left in the land over winter they should be pitted like potatoes.

Soils.

In 1914 moor and bog land formed a much larger proportion of the area under tobacco than was the case in previous years. Tobacco was grown on clay, loam, moor and bog soils varying considerably in heaviness, but no very distinct differences in the tobacco due to soil variations can be recorded at present except in the case of upland and moor. These soils produced tobacco which was succulent and thin and more inclined to injury by fungoid disease.

Preparation of land, Manuring and Rotation.

The prolonged dry weather increased the expenses of preparing land when operations were not commenced early, but it afforded ample time for thorough work. The comparatively uniform results obtained on various types of soils may be attributed largely to thorough preparation, and its effects in conserving soil moisture throughout the dry period which followed. In the case of new growers tobacco was planted, whenever possible, after a manured crop and, as a rule, 8 to 12 cwts. of artificial manure were applied without the addition of farmyard manure. Continuous culture will not be practised to the same extent in the new experiments, as heretofore, and it is expected that by means of rotation and catch-cropping the charge for manuring the tobacco crop may be reduced. The possibilities of catch-croppings are indicated by the experience in 1914 of a Co. Wexford tobacco grower who sowed three bushels of Giant Essex rye after tobacco, on three roods of land. From mid-April the rye was grazed by 17 sheep, with lambs, for a fortnight; by 5 cows for nine days, and by a donkey and a pony for a week. The tobacco crop which followed the rye was quite as good as that on adjoining land which received a dressing of dung in addition to artificial manure applied at the same rate to both plots at the time of planting the tobacco. An interesting experiment in rotation and manuring is involved in the growing of tobacco by several occupiers of labourers' cottages on half of their one-acre holdings.

Seed Beds. The experimenters provided all new growers with a uniform seed-bed equipment consisting of six glass sashes, each measuring 6 feet by 4 feet, and two tight frames for each acre grown. This equipment, which proved quite sufficient, cost £4 13*s.*, including a galvanised watering-pot fitted with two nozzles. The supply of seedlings was ample at all centres notwithstanding the occurrence of some mistakes and partial failures. Mistakes requiring mention were as follows:—Seed sown in a layer of pure, unleached wood ashes was destroyed by the free potash which such ashes contain; failure to cover seed beds at night, when the seedlings where being hardened off, caused considerable loss on 23rd May when a severe frost occurred; slight inattention to ventilation and watering during the sunny weather of April resulted in many seedlings being checked or weakened in growth or in their being completely destroyed by excessive heat and dryness; abundant watering and insufficient soil on the heating manure caused a rank, soft growth; excessive watering, unclean water, and insufficient ventilation were the causes of several outbreaks of root rot.

Planting. Transplanting to the field was begun in the middle of May, and was not completed until the end of June. Many of the earliest and best plants were destroyed or cut back to the bud by the frost on 23rd May. Only after some delay, and by using inferior plants, was it possible to complete the planting and replanting of the full acreage. On account of frost and drought the transplants in many cases started growth irregularly and many replants died. The weather was so favourable for cultivation that few growers permitted an excessive growth of weeds. In most cases the drills were kept broad but low by throwing the earth towards the plants in a proper manner at each cultivation which is an important aid to success especially in a dry season.

Topping. The operation of topping tobacco hastens the ripening process, and therefore permits of an earlier harvest. At Adare centre it was feared that the tobacco might be ripe before the curing barns were completed, and, for this reason, topping was postponed with the result that many crops deteriorated considerably in yield and quality, and the cost of topping and suckering was materially increased.

Ripening and Harvesting. The beginning of the ripening and harvesting season in August and September was rainy, but during the closing half in October the weather was dry. Weather conditions in October do not, however, favour rapid drying, and the season was therefore not favourable for wilting freshly-cut tobacco. This is a very important consideration, as it is very difficult to find in

the curing barns with which the growers have been provided, space for a full crop of tobacco which has not been wilted thoroughly. Moreover, unwilted tobacco is more liable than wilted tobacco to injury through crowding. Some better provision for wilting than most growers now possess should be provided. The method of piling the plants in the field, as mentioned in the report for last year, does not meet the requirements. Much of the tobacco grown at the centre in Co. Meath was harvested prematurely and hurriedly on account of the severe frost on 20th September, which damaged the crop slightly. Owing to delay in completing the erection of curing barns in Co. Limerick, King's Co., and Co. Meath, some loss was incurred in these districts by tobacco becoming over-ripe before it could be harvested. Most growers gave insufficient attention to the saving of leaves detached from plants by wind or during harvesting operations.

Curing Barns.

The experimenters under the new Re-handling Scheme being responsible for providing each of their growers with the necessary equipment for growing and curing his tobacco, the two larger experimenters purchased all materials in wholesale quantities and, in most cases, made similar arrangements for the erection of the barns. By this means the barns and other equipment were supplied to growers at a considerable saving. The total cost of a curing barn suitable for one acre of tobacco was not less than £50. The standard plan and specification which was adhered to in the erection of almost every barn, provided for a wooden structure, 16 feet in breadth, not less than 16 feet in height from ground level to wall plate, and 48 feet in length, if designed to accommodate the produce of one acre. The capacity of the barn was varied by altering the length only. The walls were constructed of $\frac{5}{8}$-inch rough boards placed horizontally and overlapped. The roof was half-pitch and was covered either with roofing felt or in the same manner as the sides. Two rows of horizontal ventilators, extending the entire length of each side, were provided by hingeing a single line of sheeting boards to form each row of ventilators. A large shutter hinged from the top was placed in each gable, above the level of the collar ties. Two double doors, usually on one side, completed the ventilation and provided easy access to the structure. The ample size and suitable shape of the floor space, which is quite clear of any obstructing timbers, and the convenient location, in nearly every case, with reference to the farmyard renders these curing barns most useful general purpose structures, specially suitable for cattle-feeding purposes. As to defects it is evident that barns 48 feet and more in length were not braced sufficiently, as many which were erected broadside to the prevailing wind canted more or less, and a few were blown down.

Curing.

The plan of barn described above proved to be well adapted for air-curing tobacco under Irish conditions. The ventilation is very efficient, and under normal circumstances occasional open fires of hardwood, turf, or coke, should be sufficient to cure tobacco in the most satisfactory manner. The floor being earthen and the lower tier of plants being nearly five feet above the floor level, it is possible to have a large number of small fires and to alter their position as required. The Irish Gold variety of cigarette tobacco was cured perfectly and economically in a barn of this type, heated by means of coke buckets. Owing to the harvest being from a fortnight to a month late the consumption of fuel in curing the tobacco was abnormally heavy, as was clearly shown by the opposite experience of one grower who, having an early crop, used no fuel whatever until the leaves of his tobacco were cured up to the midrib and ready to place in hollow piles where the curing may be completed at slight expense. The practice of finishing the curing in hollow piles or "kilns" after all parts of the leaves except the midribs have become brown was generally adopted in 1914. If the kilns are built and fired with due care they are a most efficient and economical device. The experience in 1914 indicated that greater care in building kilns was advisable, and that coke braziers were the only suitable means of firing them. Inability to wilt the tobacco thoroughly affected the curing adversely, but much more harm was done in this respect by the premature frost on 20th September, which caught most of the tobacco grown in Co. Meath. The damage caused by frost is not fully apparent until curing is commenced. Tobacco leaves which have until then shown no symptom of injury are inclined to give up their moisture so freely that the green colour does not disappear before they are dry. With the crops under consideration an endeavour was made to prevent this by leaving the tobacco without heat for some time after it was housed, but as a result the sappy butts of the midribs began to rot and mould from the effects of frost and much of the tobacco was damaged before this condition was noticed and got under control. The best method of curing frosted tobacco consists in maintaining, from the start, a warm, humid atmosphere in the barn by closing all ventilators tightly and burning sappy wood.

Pests and Diseases.

The pests which did appreciable harm to tobacco in 1914 were wireworms and surface caterpillars. Wireworms were very abundant in the tobacco fields of several small holders whose lands were until recently part of a large grazing ranch which had been in grass for an indefinite period. These growers have no land which is not infested with wireworm, but they are otherwise so favourably situated for growing tobacco that this drawback did not prevent the experimenter from selecting them as growers. It is possible that a catch crop of rye, strong plants, and heavy

manuring, may prevent serious loss to these growers next season. Surface caterpillars are a serious pest only in years which are marked by warm, dry weather during spring and summer. It is then possible for the caterpillars to be advanced in growth and feeding voraciously at the time when field crops such as turnips and tobacco are just establishing themselves. These conditions prevailed in 1914, and considerable damage was done by surface caterpillars, particularly in light tillage lands like those in King's County. In the worst case two-thirds of the crop was destroyed, and as many as five caterpillars were found around one plant. This is exceptional, as in most cases only an occasional plant was destroyed. These caterpillars attack tobacco by eating holes in the comparatively worthless "sand" leaves and by girdling the stalk at or below the ground level. If the stalk is girdled the plant is usually blown down by the wind when nearing its full growth.

Re-handling.

The term "re-handling" embraces the operations of receiving and purchasing cured tobacco from growers and of grading, sweating, re-drying, packing, maturing and marketing the tobacco. One who performs these functions for those who merely grow and cure tobacco is called a re-handler, and it is along these lines that the new experiment has been started with a view to thus specialising and conforming to the accepted practice in competitive tobacco-growing countries. The actual re-handling of the 1914 crop is still in progress, and comments must therefore be deferred. The growers have delivered their cured, leaf tobacco to the re-handlers' premises packed in bundles, loosely and in safe-keeping order, and the re-handlers are now engaged in preparing it for market. The crop promises to be almost an average one as to yield and quality, which is a source of satisfaction to the experimenters considering the vagaries of the season and the exceptional difficulties to be met with in the first year of a fresh undertaking.

The crop of 1913, which marked the conclusion of the series of experiments begun in 1904, was prepared for market in the same manner as preceding crops.

Marketing.

Of the tobacco produced previous to 1914 a portion of the produce of only one experimenter remains unsold, though a considerable quantity of the tobacco sold is still held in bond by purchasers. In 1914, six manufacturers in Ireland, three in England, and one in Scotland purchased Irish tobacco of the 1913 or previous crops.

Prices.

The prices, which were in some cases very good, were, with one exception, obtained by direct sale to the manufacturers.

The following figures giving the acreage, types, yields, cost, and selling prices, etc., refer to crops of 1913 and previous years. The returns for the crop of 1914 are not yet available.

TABLE I.

Showing the number of Experimenters and the Acreage, Yield and Prices of the Tobacco grown in each of the Years from 1904 to 1913 inclusive.

(This Table refers to the Large Scale Experiments only, no account being taken therein of experiments conducted under the Department's Small Growers' Scheme, or experiments not carried out under the Department's supervision.)

Year.	No. of Growers	Total Acreage	Total Yield.	Yield per Acre. Average.	Yield per Acre. Maximum	Yield per Acre. Minimum.	Average selling Price per lb.	Range of Prices per lb.
		Acres	lbs.	lbs.	lbs.	lbs.		
1904	1	20	7,984	400	—	—	5d.	4¼d. to 6d.
1905	15	34	27,566	811	1,507	176	4½d.	2¼d. to 9d.
1906	18	77½	66,714	861	1,661	277	4¾d.	2½d. to 8½d.
1907	21	93	*55,194	*634	2,299	274	4¼d.	3d. to 9d.
1908	21	101	121,191	1,200	1,971	868	5¼d.	2d. to 2s. 6d.
1909	20	130½	118,798	910	1,307	644	†5¼d.	1d. to 1s. 3d.
1910	19	118¼	95,307	806	1,112	417	†5d.	1d. to 1s. 6d.
1911	20	119½	134,486	1,125	1,496	799	†5d.	1d. to 8d.
1912	20	105 9/10	71,843	678	1,035	243	†4¼d.	1d. to 7d.
1913	19	95¼	83,944	879	1,135	296	†5¼d.	2¼d. to 8½d.

* Produce of 6 acres at Kilkenny not included, as almost the entire crop grown on that area, estimated at 10,400 lbs., was accidentally destroyed by fire.

† The average in this column is calculated on the quantity sold, the amount unsold not being taken into account.

The following quantities of tobacco have been sold since the publication of the last report on these experiments :—1909 crop, 4,992 lb. at 3d. per lb.; 1910 crop, 10,645 lb. at 2½d. per lb.; 1911 crop, 9,336 lb. at 2d. per lb.; 1912 crop, 8,616 lb. at 3¼d. per lb. The following quantities of tobacco are still unsold: 1909 crop, 15,271 lb.; 1910 crop, 6,235 lb.; 1911 crop, 6,926 lb.; 1912 crop, 2,871 lb.; 1913 crop, 2,699 lb. The average price for each of the years 1909 to 1913, inclusive, is, therefore, subject to revision.

TABLE II.

Showing for each Class and Type of Tobacco grown commercially in the Year 1913 the Yield per acre, the Cost of Production per lb. and per acre, and the Amount received for the Tobacco per lb. and per acre.

Class :—	Pipe.	Pipe and Cigarette.
Type :—	Pryor. Average of Six Centres.	Mixed. One Centre.
Average yield per acre (lb.)	916	1,048
Cost of production, per lb.	8·4d.	6·1d.
Amount received, per lb.	5·0d.	6·3d.
	£ s. d.	£ s. d.
Cost of production, per acre	32 1 4	26 11 0
Amount received, per acre	19 0 5	27 12 2

Table

Showing in detail the Expenses and Receipts per acre in the Year

(Note.—The figures for Adare are not given below, as the crop has not

Class :—	Pipe.	
Type :—	Pryor.	
Centre :—	Athlumney, Co. Meath	Cordangan, Co. Tipperary.
	£ s. d.	£ s. d.
Seedbeds	2 16 3	1 16 5
Farmyard Manure for fields	—	1 6 0
Carting and Spreading Manure	—	0 7 8
Preparation of Land	1 6 5	1 5 10
Shelter Belts	—	0 2 7
Artificial Manure	5 5 0	5 9 5
Planting	0 16 0	1 9 4
Cultivation	0 19 7	2 16 6
Suckering and Topping	0 7 7	0 17 1
Harvesting	2 17 2	2 14 4
Curing	2 0 10	2 19 6
Fermenting	—	—
Grading	2 16 9	2 3 4
Packing	1 15 3	1 0 5
Maturing	0 11 1	0 12 1
Marketing *	0 13 7	0 5 6
Rent, Taxes, and Insurance	2 15 7	2 12 4
Interest and Depreciation † (estimated)	3 10 0	3 10 0
Miscellaneous	—	—
1. Total Expenses	28 11 1	31 8 4
2. Receipts for tobacco	30 1 7	14 0 8
3. Yield of Cured Tobacco (lb.)	1,135	612
4. Average Cost of Production (per lb.)	4·9*d.*	12·3*d.*
5. Selling Price (per lb.)	6·4*d.*	5·5*d.*
6. Area under Experiment (acres)	10	10

* The variable charge for marketing is due to the fact that in some cases the tobacco was sold direct to the manufacturer and all the charges except that for delivery were borne by the purchaser; in other cases the warehouse charges were borne by the grower; and in one case the tobacco was sold in London through a broker and the charges for brokerage, commissions, and carriage greatly increased the expenses of the grower.

† This item relates to the curing equipment only, and is calculated on a 10 per cent. basis. The charge for implements is included with that for horse labour, which is taken at 3*s.* per day, exclusive of driver. Owing to the experimental nature of tobacco-growing in Ireland, elaborate and expensive curing barns have been provided at most centres, but the experiments having proved that the crops can be re-handled with less expensive equipment, it is considered more instructive to charge Interest and Depreciation upon the cheapest equipment which would be required by a person beginning the production of tobacco at the present stage. The total costs of production as set forth in the Table are likewise influenced by the experimental nature of the crop and by the inexperience of the growers.

III.

respect of various Types of Tobacco grown at certain centres in 1913.

yet been sold, and complete returns are accordingly not available.)

					Pipe and Cigarette.
					Mixed.
	Duleek,‡ Co. Meath.	Mullagh and Mullacrew, King's Co.	Smarmore, Co. Louth.	Tagoat,§ Co. Wexford.	Randlestown, Co. Meath.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
	1 15 11	1 5 1	2 1 8	1 7 2	1 7 5
	5 11 6	3 15 0	2 19 9	2 13 10	—
	0 6 6	0 12 7	0 11 9	0 13 6	—
	2 3 3	0 19 6	2 12 9	2 4 11	0 17 9
	0 1 4	—	—	0 2 6‖	—
	4 3 4	6 3 0	2 14 0	2 13 5	5 0 0
	1 13 2	0 14 1	0 8 3	0 12 5	0 12 8
	1 19 0	1 8 9	1 5 2	1 4 8	1 7 4
	0 18 2	0 16 7	0 17 9	0 12 10	0 13 2
	3 8 11	2 10 11	2 10 11	3 3 10	2 10 0
	2 1 10	2 18 2	4 6 0	4 3 8	2 6 0
	—	—	—	—	0 3 3‖
	2 8 8	2 14 4	2 12 2	2 13 7	1 18 7
	0 2 2	1 8 9	1 8 8	2 13 1	1 15 7
	—	1 7 10	0 7 3	0 17 3	—
	0 11 2	0 8 2	3 2 1	0 19 3	0 4 0
	2 10 0	1 4 3	2 11 3	1 10 1	1 5 3
	3 10 0	3 10 0	3 10 0	3 10 0	6 0 0
	—	—	—	1 0 10	—
	33 4 11	31 17 0	33 19 5	32 16 10	26 11 0
	16 5 2	19 18 4	17 11 8	15 9 0	27 12 2
	950	956	913	943	1,048
	8·4*d.*	8·0*d.*	8·9*d.*	8·4*d.*	6·1*d.*
	4·1*d.*	5·0*d.*	4·6*d.*	3·9*d.*¶	6·3*d.*
	1	14	18	12½	20**

‡ The tobacco produced at this centre was sold to a re-handler, who repacked and matured it, the charges for which were taken into consideration when the tobacco was being purchased.

§ In this case the tobacco was produced by 12 different growers in the neighbourhood of Tagoat. These growers have formed a co-operative society for the curing and disposal of the crops. In addition to the expenses incurred individually each grower is charged with a part of the general cost of curing and all subsequent operations proportionate to the weight of his crop. For details of the results in the case of each grower, see Table IV.

‖ The Expenditure under this head was incurred in respect of only a portion of the area occupied by the experiment, but has been distributed over the entire area.

¶ The price originally offered by the purchaser of this tobacco was 4·9*d.* per lb. on condition that the tobacco contained not more than 12 per cent. moisture. Owing to an irregularity in maturing, the tobacco, when sampled in bond, was found to contain up to 14 per cent. moisture, and the purchaser accordingly reduced his price by 1*d.* per lb.

** Pipe tobacco was grown on 17½ acres, and cigarette tobacco on 2½ acres.

TABLE

Showing in detail the Receipts and Expenses in respect of Tobacco Wexford, in the year 1913. The area cropped in

Class :—	Pipe.			
Type:—	Pryor.			
Name of Grower :—	Byrne, P.	Codd, N.	Doyle, E.	Doyle, M.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Seedbeds	1 8 11	1 5 4	2 8 4	0 17 5
Farmyard Manure for Fields	2 10 0	3 10 0	2 5 0	1 17 6
Spreading Manure	0 12 0	1 12 6	0 10 4	0 12 3
Preparation of Land	1 16 2	4 18 4	1 13 4	1 2 9
Shelter Belts	...	0 3 9	—	—
Artificial Manures	4 11 0	2 0 0	4 4 0	3 12 0
Planting	0 9 2	0 9 2	0 11 8	0 9 2
Cultivation	0 17 4	1 10 3	0 12 2	0 18 10
Suckering and Topping	0 8 10	1 0 10	0 5 10	0 5 0
Harvesting	2 3 9	2 16 2	0 14 2	4 16 8
Curing	5 15 11	3 13 7	2 17 9	4 18 11
Grading	3 12 1	2 5 9	1 18 3	2 18 4
Packing	3 11 6	2 5 4	1 17 11	2 17 10
Maturing	1 3 3	0 14 8	0 12 4	0 18 9
Marketing	1 5 11	0 16 6	0 13 9	1 1 0
Rent, Taxes and Insurance	1 11 1	1 12 1	1 13 1	1 10 1
Interest and Depreciation (Estimated)	3 10 0	3 10 0	3 10 0	3 10 0
Miscellaneous Expenses	1 1 8	1 1 8	1 1 8	1 1 8
1. Total Expenses	36 8 7	35 5 11	27 9 7	33 8 2
2. Receipts for Tobacco	21 3 2	12 5 2	10 6 0	19 18 4
3. Yield of Cured Tobacco (lb.)	1,271	807	674	1,028
4. Average Cost of Production per lb.	6·9*d.*	10·5*d.*	9·8*d.*	7·8*d.*
5. Selling Price per lb. *	4·0*d.*	3·6*d.*	3·7*d.*	4·6*d.*

*See Note ¶ to Table III.

IV.

grown by the Wexford Tobacco Growers' Society at Tagoat, Co.
each case was, approximately, one statute acre.

Pipe.

Pryor.

Harpur, J.	Hayes. N.	Jacob, F.B.	Keating, Mrs. M.	Murphy, N.	Pettit, T.	Walker, W.	Walsh, W. J.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1 3 0	1 15 4	1 7 1	1 3 11	1 7 2	0 18 7	0 10 2	2 14 5
2 10 0	1 10 0	4 0 0	5 0 0	2 10 0	2 0 0	3 0 0	3 0 0
0 10 7	0 9 2	0 13 3	1 3 0	0 8 10	0 15 0	0 10 10	0 10 6
1 13 4	2 17 11	1 18 2	3 0 10	4 6 11	1 13 3	1 6 3	1 14 8
—	—	0 17 3	0 2 9	0 5 1	0 2 6	—	—
2 7 11	1 0 0	2 12 6	3 9 0	1 2 0	2 14 6	3 5 3	2 10 0
0 18 4	1 7 0	0 12 9	0 17 1	0 14 8	0 8 9	0 7 4	0 10 0
1 0 1	1 13 2	2 0 4	1 6 1	2 8 9	0 16 0	0 11 5	1 14 4
0 11 8	0 19 3	0 19 10	0 11 1	0 14 10	0 14 5	0 10 5	0 18 4
3 10 3	4 0 11	4 7 7	3 5 11	3 19 5	2 6 9	4 9 0	3 7 4
4 7 6	3 12 11	4 19 4	6 5 5	3 15 2	4 2 5	5 4 7	2 12 2
2 19 3	2 9 4	2 11 5	4 2 11	2 11 3	3 0 5	3 2 6	1 18 3
2 18 9	2 8 11	2 11 0	4 2 2	2 10 10	2 19 11	3 1 11	1 17 11
0 19 1	0 15 11	0 16 4	1 7 1	0 16 4	0 19 6	1 0 2	0 12 4
1 1 4	0 17 9	0 18 3	1 9 9	0 18 3	1 1 9	1 2 6	0 13 9
1 11 7	1 14 1	1 6 7	1 7 7	1 11 1	1 11 7	1 11 7	1 16 1
3 10 0	3 10 0	3 10 0	3 10 0	3 10 0	3 10 0	3 10 0	3 10 0
1 1 8	1 1 8	1 1 8	1 1 8	1 1 8	1 1 8	1 1 8	1 1 8
32 14 4	32 3 4	37 3 4	43 6 3	34 12 3	30 17 0	34 5 7	31 1 9
17 13 0	12 3 6	13 7 5	26 6 7	12 12 6	16 17 4	21 14 6	8 15 4
1,044	870	895	1,462	892	1,065	1,102	674
7·5*d.*	8·9*d.*	10·0*d.*	7·1*d.*	9·3*d.*	7·0*d.*	7·5*d.*	11·1*d.*
4·1*d.*	3·4*d.*	3·6*d.*	4·3*d.*	3·4*d.*	3·8*d.*	4·7*d.*	3·1*d.*

Table V.

Showing per Statute Acre, for each of the Years 1909 to 1913 inclusive, the Yield of Tobacco (with Selling Price per lb.), the Cost of Production, the Amount received for the Crop, and the Loss to the Grower, apart from the Experimental Grant of £50 per acre, at centres where Pipe Tobacco was grown.

Centre.	Year.	Area under Pipe Tobacco.	Yield.	Average selling price per lb.	Cost of Production.	Amount received for Tobacco.	Loss on Tobacco.
		Acres	lbs.		£ s. d.	£ s. d.	£ s. d.
Smarmore .	1909	21½	726	5·0*d.*	36 15 11	14 17 11	21 18 0
	1910	18	417	4·9*d.*	27 18 7	8 11 0	19 7 7
	1911	18	949	5·0*d.*	28 1 3	19 15 9	8 5 6
	1912	18	588	2·7*d.*	27 2 7	6 12 4	20 10 3
	1913	18	913	4·6*d.*	33 19 5	17 11 8	16 7 9
Athlumney, .	1909	9½	878	5·6*d.*	24 4 10	20 9 7	3 15 3
	1910	10	953	5·2*d.*	24 15 6	20 15 1	4 0 5
	1911	10	1,138	5·4*d.*	23 3 9	25 15 2	**2 11 5** *(gain)*
	1912	10	421	4·0*d.*	21 11 10	7 0 4	14 11 6
	1913	10	1,135	6·4*d.*	28 11 1	30 1 7	**1 10 6** *(gain)*
*Tagoat, co. Wexford,	1909	13¼	850	5·0*d.*	28 1 7	17 14 9	10 6 10
	1910	12½	833	4·7*d.*	32 7 3	16 13 8	15 13 7
	1911	13¼	1,111	4·8*d.*	38 13 8	22 7 6	16 6 2
	1912	13	707	4·0*d.*	31 4 3	11 15 8	19 8 7
	1913	12½	943	3·9*d.*‡	32 16 10	15 9 0	17 7 10
Mullagh and Mullacrew,	1909	14	880	5·3*d.*	23 4 8	19 9 6	3 15 2
	1910	14	800	5·0*d.*	23 14 0	16 13 1	7 0 11
	1911	14	1,114	5·8*d.*	27 13 9	26 13 10	0 19 11
	1912	14	620	5·0*d.*	27 10 10	12 15 10	14 15 0
	1913	14	956	5·0*d.*	31 17 0	19 18 4	11 18 8
†Randlestown, .	1910	18½	1,063	5·5*d.*	25 0 0	24 4 0	0 16 0
	1911	20	1,605	5·2*d.*	27 0 8	31 17 0	**4 16 4** *(gain)*
	1912	17¾	1,033	5·0*d.*	25 1 8	21 13 1	3 8 7
	1913	17½	1,027	6·2*d.*	23 8 3	26 11 4	**3 3 1** *(gain)*
†Cordangan, .	1910	5	599	4·5*d.*	38 9 0	11 3 9	27 5 3
	1911	5	1,240	4·5*d.*	46 15 3	22 19 10	23 15 5
	1912	10	243	5·5*d.*	32 16 1	5 11 5	27 4 8
	1913	10	612	5·5*d.*	31 8 4	14 0 8	17 7 8

* In the case of Tagoat the tobacco was produced by 12 different growers. See Note § to Table III.

† More than one class of tobacco was grown at Randlestown in 1910, 1911, 1912 and 1913, and at Cordangan in 1910 and 1911, and as separate expense accounts were not accurately kept for the several classes, the figures representing the cost of production in these cases are estimates which were carefully made by the respective experimenters at the time the work was performed.

‡ See Note ¶ to Table III.

TABLE VI.

Showing (1) the Average Price per lb.; and (2) the Relative Quantities expressed as percentages of the total crop, of each of the grades of pipe tobacco grown at Randlestown, Smarmore, Athlumney, and Tagoat, during each of the Years 1909, to 1913, inclusive, and at Cordangan in each of the years 1910 to 1913 inclusive.

Centre.	Year.	Area under Pipe Tobacco.	Average yield of Cured Pipe Tobacco per Acre.	Average Price per lb.			Relative quantities of the different grades produced, expressed as *percentages* of the total crop.		
				1st Grade	2nd Grade	3rd Grade	1st Grade	2nd Grade	3rd Grade
		Acres.	(lbs.)	*d.*	*d.*	*d.*			
Randlestown, co. Meath,	1909	10½	852	7·2	5·6	4·5	38	39	23
	1910	18½	1,065	6·5	5·5	4·5	25	46	29
	1911	25¼	1,486	7·3	5·1	4·5	21	40	39
	†1912	17¾	992	6·6	5·0	4·5	19	48	33
	1913	17⅛	1,027	7·8	5·6	4·5	44	23	33
Smarmore, co. Louth,	1909	21½	743	6·5	5·5	4·5	5	30	65
	1910	18	417	5·8	5·0	4·3	12	60	28
	1911	18	949	6·3	5·5	3·4	25	43	32
	†1912	18	352	—	3·0	2·5	—	57	43
	1913	18	913	5·5	4·3	3·8	54	4	42
Athlumney, co. Meath,	1909	9½	885	6·5	5·5	4·5	43	26	31
	1910	10	953	5·8	5·0	4·5	43	36	21
	1911	10	1,138	6·5	5·5	4·5	30	40	30
	1912	10	421	6·6	5·1	3·0	5	14	81
	1913	10	1,135	7·4	5·5	5·4	48	22	30
*Tagoat, co. Wexford,	1909	13¼	850	6·0	5·0	4·6	28	45	27
	1910	13¼	831	5·4	4·8	4·3	18	47	35
	1911	13¼	1,111	6·5	4·6	3·9	22	51	27
	†1912	13	624	5·1	4·0	3·4	26	44	30
	1913	12½	943	§5·1	§3·7	§2·6	42	33	25
Cordangan, co. Tipperary	1909‡	—	...	—	—	...	...	...	...
	1910	4½	572	5·5	4·8	4·0	26	40	34
	1911	5	1,240	7·0	5·5	3·8	3	35	62
	†1912	10	243	6·5	5·5	4·3	41	24	35
	1913	10	612	6·3	4·3	3·0	72	15	12

* In the case of Tagoat the tobacco was produced by twelve different growers. See Note § to Table III.

† The figures for 1912 do not include the amount of tobacco damaged by frost, varying from 2 per cent. to 61 per cent. of the grower's crop, account of which was given in Table III. of the Department's JOURNAL for January, 1914.

‡ Cigar tobacco only was grown in 1909 at this centre.

§ See Note ¶ to Table III.

NOTE.—Pipe tobacco exclusively was grown at Mullagh-Mullacrew centre during 1909, 1910, 1911, 1912, and 1913, but owing to the fact that the tobacco was sold each year at a round or average price per lb. without reference to the relative value of the different grades, no figures for inclusion in the above Table are available for this centre.

TABLE

Summary of Results of Small Growers'

Re-handler.	Grower.	(1) Cost of production per acre to Grower exclusive of his labour.			(2) Re-handler's expenses per acre exclusive of any charge for Interest and Depreciation		
		£	s.	d.	£	s.	d.
Col. Sir N. T. Everard, Bart., H.M.L., Randlestown, Navan, Co. Meath.	Best, W. E.	14	7	2	4	17	1
	Brabazon, Thos.	11	14	0	3	18	1
	Brennan, Thos.	12	0	4	3	2	10
	Caffery, Jas. (Mullaha)	11	19	7	3	9	7
	Caffery, Jas. (Wilkinstown)	10	13	4	3	1	11
	Callaghan, Pk.	8	17	5	4	5	4
	Callan, Jas.	10	12	3	3	3	8
	Collins, J.	11	13	8	2	15	1
	Connell, H.	12	2	5	2	19	2
	Crinion, R.	12	2	1	4	7	11
	Davis, Jno.	12	14	3	2	2	5
	Dogherty, Thos.	11	2	2	2	9	4
	Dogherty, Pk.	12	2	0	3	11	2
	Duffy, Thos.	11	10	6	3	19	11
	Everard, R. W.	13	1	1	4	0	7
	Flood, Pk.	11	18	0	1	15	8
	Giblin, Thos.	12	4	6	5	10	6
	Halpin, Mary	12	7	6	3	0	8
	Harte, Pk.	9	9	5	1	0	0
	Heany, Owen	11	4	4	4	10	9
	Hughes, Jas.	12	5	0	2	16	10
	M'Hugh, Matt.	11	16	5	3	7	3
	M'Hugh, Peter	8	18	11	5	0	10
	M'Hugh, Thos.	11	14	1	4	0	4
	M'Ivor, Thos.	10	9	8	2	10	10
	M'Kenna, Henry	11	18	4	4	2	5
	Mitchell, Jno.	11	16	10	5	3	5

VII.

("Re-handling") Experiment in the Year 1913.

(3) Total cost of production per acre omitting items excluded under Nos. 1 and 2.	(4) Total Receipts per acre for finished Tobacco.	(5) Amount available for covering cost of Grower's labour, and Re-handling charges for Interest and Depreciation.	(6) Yield per acre.	(7) Average Price per lb. received by Re-handler for finished Tobacco.	(8) Area under experiment
£ s. d.	£ s. d.	£ s. d.	lbs.	d.	a. sq.yds.
19 4 3	20 11 9	1 7 6	1,270	3·9	1 182
15 12 1	15 16 3	0 4 2	817	4·6	0 2,428
15 3 2	15 14 4	0 11 2	757	5·0	1 0
15 9 2	15 17 9	0 8 7	771	5·0	1 72
13 15 3	13 13 4	0 1 11 (deficit)	766	4·3	1 578
13 2 9	26 11 9	13 9 0	1,115	4·9	1 1,803
13 15 11	14 16 2	1 0 3	807	4·4	2 1,042
14 8 9	10 17 6	3 11 3 (deficit)	612	4·3	1 0
15 1 7	12 4 3	2 17 4 (deficit)	678	4·3	1 0
16 10 0	23 6 9	6 16 9	1,090	5·1	1 196
14 16 8	7 12 10	7 3 10 (deficit)	489	3·8	1 318
13 11 6	11 3 7	2 7 11 (deficit)	579	4·6	1 0
15 13 2	17 0 0	1 6 10	864	4·7	1 0
15 10 5	20 15 2	5 4 9	1,066	4·7	1 181
17 1 8	27 4 1	10 2 5	1,174	5·6	5 0
13 13 8	5 5 4	8 8 4 (deficit)	381	3·3	1 83
17 15 0	25 17 7	8 2 7	1,184	5·2	0 2,420
15 8 2	14 5 4	1 2 10 (deficit)	740	4·6	0 2,420
10 9 5	5 8 2	5 1 3 (deficit)	358	3·6	0 4,779
15 15 1	24 9 6	8 14 5	1,272	4·6	2 0
15 1 6	11 16 0	3 5 0 (deficit)	642	4·4	0 2,420
15 3 8	16 17 7	1 13 11	874	4·6	0 4,779
13 19 9	25 2 2	11 2 5	1,270	4·7	0 2,420
15 14 5	22 7 7	6 13 2	1,051	5·1	1 317
13 0 6	8 2 6	4 18 0 (deficit)	561	3·5	1 2,964
16 0 9	19 12 9	3 12 0	959	4·9	1 149
17 0 3	24 16 8	7 16 5	1,234	4·8	0 2,640

[*Continued on pages* 544-5.

TABLE

Re-handler.	Grower.	(1) Cost of production per acre to Grower exclusive of his labour.	(2) Re-handler's expenses per acre exclusive of any charge for Interest and Depreciation
		£ s. d.	£ s. d.
Col. Sir N. T. Everard, Bt., H.M.L., Randlestown, Navan, Co. Meath.	Mongey, Thos.	12 3 2	4 1 9
	Mullen, Jane	11 6 4	3 19 6
	Newman, Jas.	10 2 1	2 18 7
	Peamount Sanatorium	12 4 9	2 5 2
	Price, Pk.	13 6 10	5 10 10
	Reid, Matt.	10 7 10	1 19 2
	Reilly, Pk.	8 6 1	3 19 4
	Rorke, Jas.	11 15 3	4 2 8
	Rowan, Laurence	14 0 1	4 8 6
	Togher, Jno.	12 7 11	4 8 9
	Traynor, Thos.	9 12 8	4 1 5
	Wogan, Peter	7 14 2	2 10 1
R. C. Metge, Esq., Johnstown, Navan.	Kennedy, Thos.	11 17 2	4 13 1
	Loughran, Fras.	16 9 3	6 6 8
	Navagh, Jos.	8 9 0	3 14 7
Geo. Taaffe, Esq., D.L., Smarmore, Ardee.	French, Ml.	13 10 3	3 15 0

VII.—*continued.*

(3) Total cost of production per acre omitting items excluded under Nos. 1 and 2.	(4) Total Receipts per acre for finished Tobacco.	(5) Amount available for covering cost of Grower's labour, and Re-handling charges for Interest and Depreciation.	(6) Yield per acre.	(7) Average Price per lb. received by Re-handler for finished Tobacco.	(8) Area under experiment.
£ s. d.	£ s. d.	£ s. d.	lbs.	d.	a. sq. yds.
16 4 11	17 4 10	0 19 11	937	4·4	1 0
15 5 10	20 18 7	5 12 9	983	5·1	1 0
13 0 8	15 13 0	2 12 4	747	5·0	1 605
14 9 11	10 3 10	4 6 1 (deficit)	556	4·4	1 2,102
18 7 8	30 4 4	11 6 8	1,422	5·1	1 242
12 7 0	8 16 6	3 10 6 (deficit)	498	4·3	2 1,115
12 5 5	24 3 2	11 17 9	1,058	5·5	2 91
15 17 11	18 13 4	2 15 5	1,086	4·1	2 0
18 8 7	25 14 1	7 5 6	1,167	5·3	1 514
16 16 8	21 6 2	4 9 6	1,176	4·3	1 0
13 14 1	20 8 1	6 14 0	943	5·2	0 3,630
10 4 3	10 15 5	0 11 2	632	4·1	2 484
16 10 3	20 7 6	3 17 3	918	5·3	1 0
22 15 11	26 1 4	3 5 5	1,249	5·0	1 0
12 3 7	14 17 0	2 13 5	736	4·8	0 3,630
17 5 3	16 16 2	0 9 1 (deficit)	1,059	3·8	1 0

CULTIVATION OF SEAWEED IN IRELAND.

The value of seaweed for agricultural and industrial purposes as well as, to a more limited extent, a food-stuff, has long been appreciated in this country. Nevertheless, at a time like the present when more or less of a famine in potash salts is threatened no apology is needed for emphasizing its value, particularly for crops such as the potato crop, which, for successful growth, require an adequate supply of such salts.

Not only should the fullest possible use be made at the present juncture of all the seaweed derivable from natural sources but since it can be and is, in certain districts, artificially cultivated, as will be described, the question as to whether a further extension of such cultivation would not be both practicable and profitable deserves earnest consideration.

Kinds of Seaweed Used.

Broadly speaking there are two classes of weed which are made use of in a large way. In the first place there are the large brown weeds which grow in the deeper waters off rocky portions of the coast, belonging mainly to the botanical genus Laminaria. During stormy weather the "fronds" and "stalks" of these plants (known locally as "heads" and "roots" or "tangle" and "sea-rods" respectively) become washed ashore. They are then collected, stacked to dry and subsequently burned to produce kelp from which iodine is eventually extracted.

The second class of seaweeds consists of those species, mainly of the genus Fucus and its allies, whose habitat is between high and low-water marks, commonly known as "wrack." These weeds grow attached to rocks and stones; and although considerable quantities of them come ashore as "drift" weed in some localities, the greater portion of what is used is cut directly from the rocks and stones and is therefore commonly known as "cut-weed." Cut-weed or wrack is used almost exclusively for manurial purposes and a detailed account of its value and manner of use in this way will be found in the Department's Leaflet No. 99: "Seaweed as Manure," which, like all the other Leaflets issued by the Department, may be obtained free of charge and post free upon application to the Secretary.

It is to be noted that the varieties of seaweed useful as manure all grow attached to rocks or stones and consequently these weeds are absent from those portions of the coast where such rocks and stones are not present, that is in sandy or muddy bays or estuaries. Their absence, however, in the majority of cases, at any rate, is simply and solely due to the absence of a suitable substratum to which the plants may anchor themselves, for, experience and practice show that by providing such a substratum these weeds can be in-

CULTIVATION OF SEAWEED IN IRELAND.

Fig. 1.—View looking south over Achill Sound, Co. Mayo, showing artificial seaweed beds both in foreground and middle distance, tide not fully at the ebb.

CULTIVATION OF SEAWEED IN IRELAND.

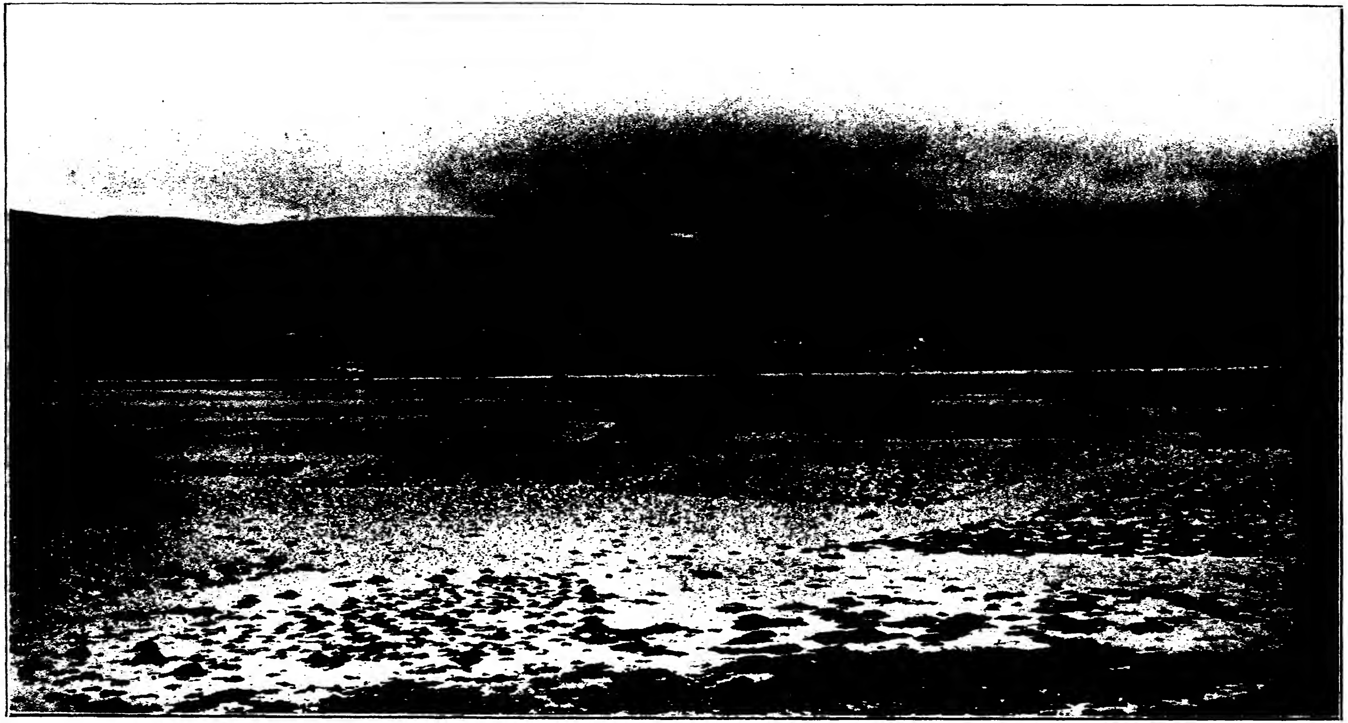


Fig. 2.—Artificial seaweed beds in Achill Sound, as exposed at low water.

duced to grow in places from which naturally they would otherwise be absent. By the "cultivation of seaweed" therefore is meant the provision of suitable anchorages, generally large stones, between tide marks, in localities where rocks and stones are naturally absent.

Where Seaweed is Cultivated.

There are several places round the coast of Ireland where seaweed is cultivated in this way and there are probably a number of suitable localities to which this admirable practice might be extended with advantage. The best known localities are perhaps Achill Sound in Co. Mayo, Ardara and Carndonagh in Co. Donegal, and Mill Bay in Co. Down.

Method of Cultivation.

At Achill the seaweed beds are situated in the shallow tidal waters of the Sound and belong to those farmers whose land fringes the coast. Large stones are collected from the shore, taken out in boats at high tide, thrown overboard and subsequently, at low-water, arranged in more or less regular lines forming rectangular beds or fields on the muddy or sandy bottom. Fig. 1 is a view looking south over Achill Sound and shows some of these beds both in the foreground and in the middle distance, the tide not being fully at the ebb when the photograph was taken, while Fig. 2 shows some of the beds fully uncovered by the tide.

The crop of weed is cut once in two years and is used as a rule by the farmer owning the bed, being but rarely sold. In course of time the stones naturally tend to sink into the somewhat soft substratum and when this happens they are raised by spades and crowbars and are not turned over as is done at Mill Bay. Fig. 3 is a nearer view of one of the beds in which the weed is about half grown.

The most abundant species of weed in the Achill beds is the "bladder-wrack," *Fucus vesiculosus*, which grows very luxuriantly in the comparatively shallow water of the Sound. Mixed with this is a certain amount of *Ascophyllum nodosum*, and, where the stones are laid in somewhat deeper water, *Fucus serratus* finds a suitable habitat.* Fig. 4 illustrates a growth of the first-named of these species, while Fig. 5 shows Ascophyllum now preponderating on a stone from which most of the bladder-wrack has evidently been cut fairly recently. The seaweed cut from the Achill beds is used chiefly as a manure for the potato crop, being spread in its fresh condition on the ridges or "lazy-beds" and allowed to lie for a few days and become somewhat bleached before being covered.

At Mill Bay, between Greencastle and Killowen in Co. Down, the cultivation of seaweed is also practised on an extended scale. The first of the beds in this area was formed many years ago by bringing granite stones from the adjacent Mourne Mountains and

* Cotton, A. D., "Clare Island Survey. Marine Algae." *Proc. Roy. Irish Acad.* Vol. 31, Part 15, 1912, p. 53.

placing them—one to about each square yard—out on the sands below high-water mark. Quantities of these stones, which vary in size from that of a man's head to others three times as big, are still being carted out to the sands and there are now hundreds of acres devoted to the cultivation of seaweed in this district.

Ownership of "Beds."

The right to use a certain area of sand or "bed" in this manner was granted by the landlord at a nominal rent. Boundaries are marked by arranging the stones on the margins of the beds in straight lines and sub-divisions of the beds are marked by pegs. Some of these beds are situated fully a mile and a half from high-water mark.

The stones, of course, become covered by the sea at each incoming tide, and they soon become coated with a growth of "seedling" seaweed plants. The growth of the weed is most rapid on those stones which remain longest submerged, i.e., those nearest low-water mark, and the most valuable beds are therefore situated in this region. The weed is cut with a hook, and while from the beds near low-water a cutting can be made once in two years, this can only be done with advantage from those higher up the shore once every three years.

As at Achill, the weed which grows earliest and most abundantly in Mill Bay is the "bladder-wrack" (*Fucus vesiculosus*) and this is the species which is valued most by the farmers. Later the less esteemed *Ascophyllum nodosum*, locally known as "whang," makes its appearance. On both of these species, but more particularly on the latter, an epiphytic red seaweed (*Polysiphonia fastigiata*) occurs, which is regarded by the farmers as an undesirable "weed." In order to obviate as far as possible the development of this weed and to encourage the growth of the bladder wrack the stones are turned over after the crop has been cut. Although the sand is firm enough to permit of taking the weed ashore in carts, the stones have a tendency to sink into and become covered by the sand, and when this occurs they are raised by means of a spade or strong fork.

Under the new Land Acts, the seaweed beds have in many instances been bought out along with the tenants' farms, and it is understood that permission has been given by the Estates Commissioners to some of the farmers to sell a portion of their beds. As recently as November, 1913, a bed measuring thirty-eight square perches (Irish) in area was sold for over £40.

Price of Seaweed.

The price per ton load of the weed "on foot" averaged, in 1913, about fifteen to sixteen shillings. In 1914, probably owing to the smaller demand for the weed, consequent upon a diminished area devoted to potatoes in the district, the price per ton was much lower, being only about eight shillings, exclusive of cutting and carting.

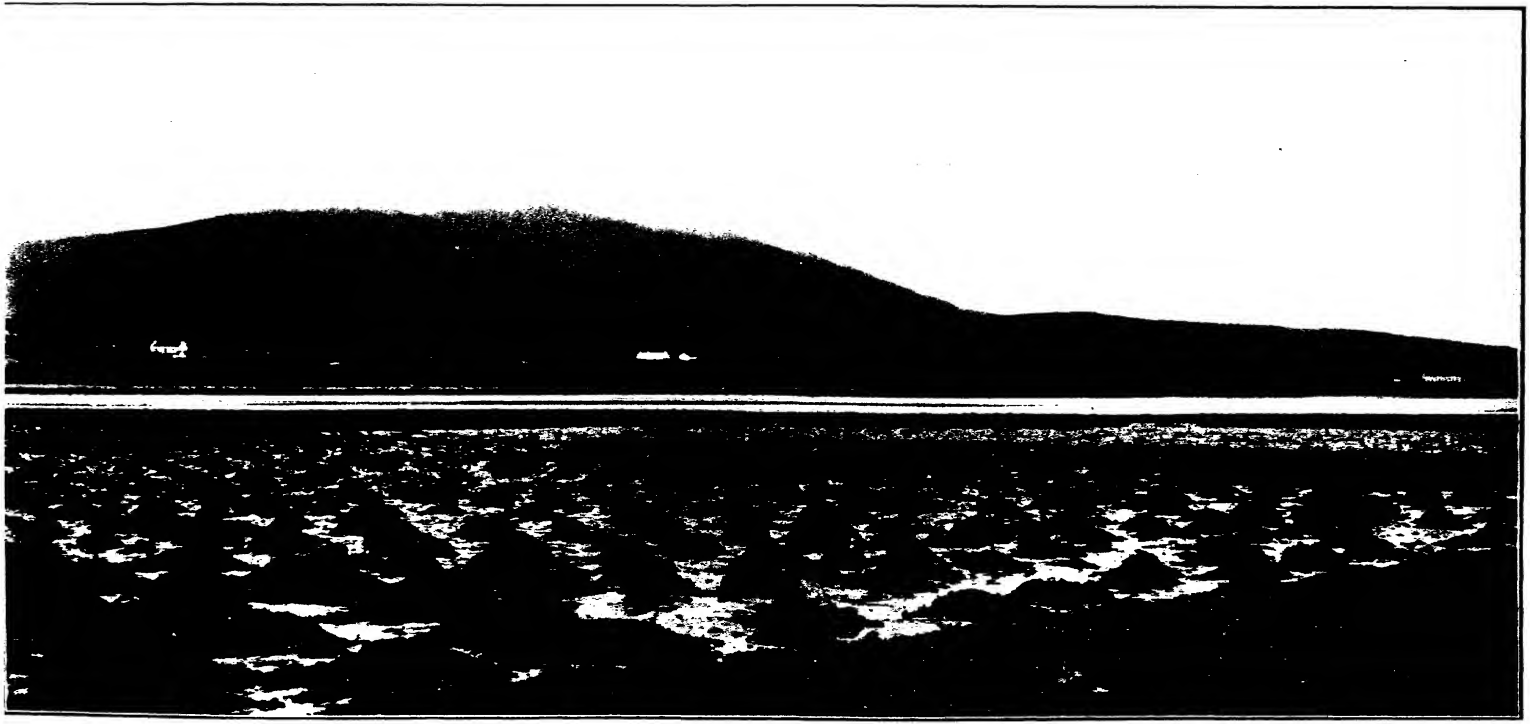


Fig. 3.—A closer view, taken from the corner of one of the rectangular artificial seaweed beds in Achill Sound, the crop on the stones is about half grown.

CULTIVATION OF SEAWEED IN IRELAND.

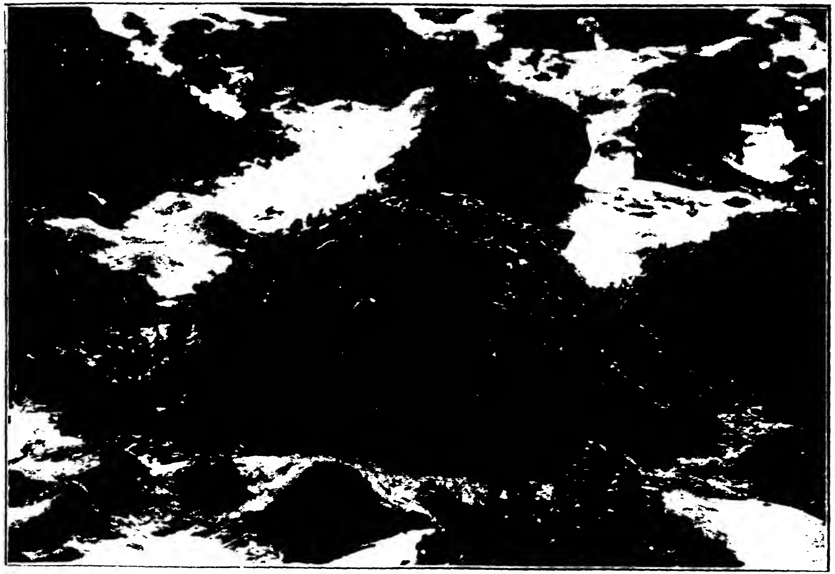


Fig. 4.—A stone in one of the beds covered with a good crop of the "bladder-wrack" (*Fucus vesiculosus*) on it. This is the species most prized for its manurial value.

Fig. 5.—A stone in one of the beds with meagre growth on it of another kind of "bladder-wrack" (*Ascophyllum nodosum*), of less value as manure.

As in the Achill area so also in the Mill Bay district, where relatively little farm stock is kept, the weed is used principally as a manure for potatoes, and it is placed directly in the drills in the condition in which it is cut. In some cases it is carted from the shore to a distance of from eight to nine miles inland.

In addition to the seaweeds used as manure and for the production of kelp others such as "Carragheen Moss" (*Chondrus crispus* and *Gigartina mamillosa*), "sloke" and "dillisk" (*Porphyra vulgaris* and *P. laciniata*) find employment in textile industries and for food purposes. These species, however, are at present merely collected and not "cultivated." In other countries seaweeds are also much used and perhaps the country having the pre-eminence in this respect is Japan. Up to forty years ago, so Prof. K. Yendo states,* the Japanese collected seaweeds for their domestic use only, but owing to the development of a considerable export trade the natural habitats became depleted, and resort was had to artificial cultivation of certain of the weeds along lines which had been in operation for over two hundred years in the case of one species of Porphyra.

After reading the interesting accounts of what the Japanese are doing in the systematic cultivation of seaweeds for various purposes one cannot but inquire whether it would not be desirable to devote considerably more attention to this subject in our own country. Mr. Cotton, in the paper already alluded to, has made the suggestion that it might be possible by placing large stones in areas such as the tidal flats of Belfast Lough to secure the growth of bladder-wrack to replace that of the green "sea-lettuce" (*Ulva latissima*). This latter weed is more or less of an intolerable nuisance where it occurs in quantity, for, upon its decay it gives rise to volatile products having a very objectionable odour. It might of course be found that the use of stones in such an area was impossible, in which case instead of trying to replace the Ulva by a more useful and less objectionable kind of seaweed the Ulva itself might be "cultivated," possibly on twigs or brush-wood, or at any rate its growth *controlled* in such a manner that the weed could be gathered when full grown and before decay set in. It would surely be no great tax on the resources of chemical industry to find a method of converting the fresh, green Ulva, so rich in nitrogenous matter, into a form which might serve as the basis of a valuable fertiliser. It is clear, at any rate, that although a certain amount of attention has been devoted to the cultivation of seaweeds in Ireland the industry is as yet in its infancy, and there appears to be no doubt but that its extension upon some such lines as those indicated might be undertaken with considerable prospects of success.

George H. Pethybridge.

* Yendo, K., "On the Cultivation of Seaweeds, with Special Accounts of their Ecology." *Economic Proc. Roy. Dublin Society*, Vol. II., No. 7, 1914, p. 105.

COMPOSITION OF THE GRAIN, FLOUR AND MILLING OFFALS OF FOUR VARIETIES OF WHEAT.

In 1908 the Department of Agriculture and Technical Instruction for Ireland commenced a series of experiments, with the object of ascertaining the agricultural and milling values of Red Fife, Square Head Master, White Queen, and White Stand Up Wheats.

In these investigations the Department received considerable assistance from members of the Irish Millers' Association, several of whom carried out milling tests with the produce of the field plots situated in their respective districts.

The separate milling of the four wheats under experiment presented an excellent opportunity for an investigation of the composition of the various milling by-products, in addition to that of the flour of each variety. Arrangements were made accordingly with Messrs. Brown and Crosthwait, of Bagenalstown, who milled the produce of the plots grown in their district, to keep each by-product separate, and to submit samples of all to the Department for analysis.

The produce of one Experimental Centre was treated in this manner in 1908, and that of three Centres in 1909.

The following details regarding the character of the soil, subsoil, and previous treatment of the land on which the four wheats were grown at each centre are taken from the annual reports on Wheat for the years 1908 and 1909.

Centre.	Soil and Subsoil.	Previous treatment of Land.
1908 T. Tennant, Oldtown, Bagenalstown, Co. Carlow	Good deep loam. Subsoil—Limestone Gravel	1906, Roots 1907, Barley
1909 (1) Do. ..	do. ..	1907, Oats 1908, Roots
(2) T. S. Malone, Ardristan, Tullow, Co. Carlow	Good deep loam. Subsoil—Yellow Clay and Limestone Gravel	1907, Oats 1908, Roots
(3) R. K. Wright, Kilkea Mageney, Co. Kildare	Deep loam. Subsoil—Yellow Clay and Gravel	1907, Oats 1908, Roots

The three by-products considered in this report are bran, pollard, and germ meal, each of which, together with the whole wheat and the resulting flour, was analysed for moisture, oil, albuminoids, carbohydrates, fibre, and ash.

Origin of Various By-Products.

The object of wheat milling, as practised to-day, is the separation of the outer closely-adhering skin of the wheat berry from the endosperm or starchy interior. The success of milling depends largely on the degree to which the bran or skin of the grain is capable of being cleaned of adhering endosperm, which, when thoroughly ground, constitutes flour, and as such the most valuable product of the mill. The separation of the endosperm from the bran or skin of the wheat is effected by passing the wheat between a series of metal rollers, which crack it and liberate the interior of the grain.

Bran.

When the attrition of the grain has reached a sufficiently advanced stage, the whole of the ground material is passed through a number of graduated fine sieves, which separate the coarse flakes of bran from the finer flour.

Pollard.

Before the bran has reached this stage, however, it has itself suffered a certain amount of breaking down, and is, consequently, capable of differentiation into coarse and fine portions. The latter also contains varying quantities of flour which are so intimately mixed with minute portions of bran as to defy separation. This product is known as pollard.

Germ Meal.

During the first cracking of the wheat the germ becomes separated from the other portions of the grain. It is removed from the mixture by suitable sieves or riddles, mixed, however, with small but variable quantities of bran and flour

The results of the analysis of the samples as received in the Department are shown in the two following Tables—I. and II.

[TABLES.

TABLE I.

1908.

	Moisture.	Oil.	Albuminoids.	Carbohydrates.	Fibre.	Ash
1. WHEAT GRAIN	%	%	%	%	%	%
Red Fife . .	15·22	1·40	11·98	67·49	1·99	1·92
White Queen .	15·45	1·41	10·55	69·58	1·51	1·50
White Stand Up .	15·33	1·16	8·90	70·98	2·18	1·45
Square Head Master	15·43	1·33	9·62	70·11	1·93	1·58
2. FLOUR						
Red Fife . .	15·81	·85	13·12	69·59	·08	·55
White Queen .	15·40	·63	9·64	73·88	·05	·40
White Stand Up .	15·24	·84	8·75	74·67	·05	·45
Square Head Master	15·70	·36	9·64	73·45	·05	·80
3. BRAN						
Red Fife . .	12·75	4·22	13·98	54·24	8·96	5·85
White Queen .	13·92	3·08	13·12	55·21	9·24	5·43
White Stand Up .	13·34	2·36	12·94	57·41	8·92	5·03
Square Head Master	14·83	2·74	14·87	52·74	9·07	5·75
4. POLLARD						
Red Fife . .	14·55	4·23	15·75	57·88	3·74	3·85
White Queen .	13·95	4·08	14·00	61·29	3·93	2·75
White Stand Up .	14·52	2·99	13·04	62·91	3·98	2·56
Square Head Master	14·63	3·31	13·80	62·28	3·28	2·70
5. GERM MEAL						
Red Fife . .	12·77	6·92	22·75	51·89	2·02	3·65
White Queen .	13·10	7·14	22·66	51·24	2·16	3·70
White Stand Up .	13·22	5·78	18·37	56·40	2·43	3·80
Square Head Master	13·32	6·53	20·99	52·24	3·32	3·60

	Red Fife.			White Queen.			White Stand Up.			Square Head Master.		
	Malone.	Tennant.	Wright.	Malone.	Tennant.	Wright.	Malone.	Tennant.	Wright.	Malone.	Tennant.	Wright.
1.—WHOLE GRAIN.												
	%	%	%	%	%	%	%	%	%	%	%	%
Moisture	14·37	13·95	14·52	14·53	14·81	15·02	14·89	13·95	12·05	13·46	13·34	14·01
Oil	1·84	1·75	1·71	1·50	1·49	1·73	1·28	1·58	2·22	1·53	1·36	1·27
Albuminoids	12·25	12·25	12·16	10·06	9·19	10·32	10·06	9·88	9·88	10·94	11·02	10·50
Carbohydrates	67·74	67·73	68·02	70·45	70·77	69·06	70·52	71·39	72·36	70·65	71·08	71·19
Woody Fibre	2·13	2·63	2·06	1·91	2·35	2·54	1·78	1·82	2·01	1·98	1·67	1·53
Ash	1·67	1·69	1·53	1·55	1·39	1·33	1·47	1·38	1·48	1·44	1·53	1·50
2.—FLOUR.												
Moisture	12·61	12·57	12·62	12·02	12·33	13·52	12·17	13·26	12·57	13·11	12·99	12·46
Oil	·87	·87	·67	·50	·59	·41	·95	·96	·81	·48	·52	·46
Albuminoids	11·81	11·64	11·20	9·42	9·01	9·42	9·62	9·45	9·21	9·81	9·62	9·45
Carbohydrates	74·15	74·44	75·01	77·71	77·67	76·16	76·74	75·88	76·91	76·10	76·39	77·23
Ash	·56	·48	·50	·35	·40	·49	·52	·45	·50	·50	·48	·40
3.—BRAN.												
Moisture	10·64	10·97	11·55	10·00	12·33	10·19	9·65	10·86	10·66	12·17	12·36	11·33
Oil	4·42	4·50	3·52	3·80	4·00	3·15	2·62	2·97	3·05	3·70	3·47	4·15
Albuminoids	13·30	12·17	13·56	13·74	13·74	13·30	13·82	14·00	13·56	14·77	14·08	14·08
Carbohydrates	54·12	54·31	55·84	56·08	54·26	56·65	56·93	54·85	56·29	54·91	53·14	55·36
Woody Fibre	11·46	11·53	9·63	10·20	9·20	10·60	11·26	11·24	10·63	8·05	10·66	8·67
Ash	6·06	6·52	5·90	6·18	6·47	6·11	5·72	6·08	5·81	6·40	6·29	6·41
4.—POLLARD.												
Moisture	10·73	10·41	10·57	10·14	10·42	10·60	11·44	11·70	11·26	11·58	11·22	11·95
Oil	4·40	4·75	3·95	4·43	4·49	4·01	3·90	3·97	3·40	4·45	3·85	3·80
Albuminoids	16·12	16·62	16·62	14·95	14·70	14·78	14·95	14·86	14·28	14·28	14·28	13·44
Carbohydrates	59·83	58·17	61·30	60·81	62·24	61·37	60·40	60·53	62·90	61·04	61·76	62·25
Woody Fibre	4·86	5·62	4·04	5·09	4·10	5·12	5·69	5·16	4·56	5·30	5·39	5·45
Ash	4·06	4·43	3·52	4·58	4·05	4·12	3·62	3·78	3·60	3·35	3·50	3·11
5.—GERM MEAL.												
Moisture	9·78	10·43	8·87	11·17	11·26	9·20	10·70	10·65	10·90	9·72	10·32	9·77
Oil	7·18	7·25	7·46	5·88	5·28	6·60	5·32	6·57	6·02	7·40	7·56	7·60
Albuminoids	18·50	19·67	19·67	21·42	21·00	22·05	19·25	18·37	20·12	22·74	22·30	22·74
Carbohydrates	57·42	55·80	56·71	55·55	55·89	55·84	58·81	58·71	56·99	53·59	53·32	53·61
Woody Fibre	3·30	3·28	3·78	2·43	2·98	2·43	2·36	1·88	2·24	2·59	2·62	2·44
Ash	3·82	3·57	3·51	3·55	3·59	3·88	3·56	3·82	3·73	3·96	3·88	3·84

It will be noticed that the percentage of moisture shows a considerable variation in the different products, and consequently it is only by reducing the whole of the figures to percentages *on dry matter* that a true comparison of the proximate constituents can be obtained.

All the figures are accordingly reduced to this basis in the following Table—III., and in order to provide a clearer comparison of the value of the four varieties grown at three different centres in 1909 each variety is set out separately.

TABLE III.

RED FIFE.—1909.

PERCENTAGE CALCULATED ON DRY MATTER.

	Centre.		
	Malone.	Tennant.	Wright
1. *Whole Grain*—	%	%	%
Oil	2·15	2·03	2·01
Albuminoids	14·31	14·23	14·22
Carbohydrates	79·09	78·71	79·59
Woody Fibre	2·47	3·06	2·41
Ash	1·98	1·97	1·77
2. *Flour*—			
Oil	·99	·98	·77
Albuminoids	13·50	13·31	12·82
Carbohydrates	84·87	85·16	85·83
Woody Fibre	—	—	—
Ash	·64	·55	·58
3. *Bran*—			
Oil	4·94	5·17	3·98
Albuminoids	14·90	13·67	15·33
Carbohydrates	60·56	61·02	63·13
Woody Fibre	12·82	13·00	10·89
Ash	6·78	7·14	6·67
4. *Pollard*—			
Oil	4·90	5·32	4·42
Albuminoids	18·14	18·55	18·59
Carbohydrates	67·02	64·92	68·55
Woody Fibre	5·44	6·27	4·51
Ash	4·50	4·94	3·93
5. *Germ Meal*—			
Oil	7·96	8·09	8·19
Albuminoids	20·50	21·96	21·58
Carbohydrates	63·64	62·29	62·23
Woody Fibre	3·66	3·67	4·15
Ash	4·24	3·99	3·85

TABLE III.—Continued.

WHITE QUEEN.—1909.

Percentages Calculated on Dry Matter.

	Centre.		
	Malone.	Tennant.	Wright.
	%	%	%
1. *Whole Grain*—			
Oil . . .	1·76	1·75	2·05
Albuminoids . .	11·77	10·79	12·14
Carbohydrates . .	82·43	83·07	81·27
Woody Fibre . .	2·23	2·76	2·98
Ash . . .	1·81	1·63	1·56
2. *Flour*—			
Oil . . .	·57	·67	·55
Albuminoids . .	10·70	10·28	11·29
Carbohydrates . .	88·31	88·67	87·58
Woody Fibre . .	—	—	—
Ash . . .	·42	·38	·58
3. *Bran*—			
Oil . . .	4·22	4·56	3·54
Albuminoids . .	15·27	15·67	14·80
Carbohydrates . .	62·31	61·89	63·06
Woody Fibre . .	11·33	10·49	11·80
Ash . . .	6·87	7·39	6·80
4. *Pollard*—			
Oil . . .	4·93	5·01	4·49
Albuminoids . .	16·65	16·41	16·53
Carbohydrates . .	67·66	69·49	68·64
Woody Fibre . .	5·67	4·59	5·74
Ash . . .	5·09	4·50	4·60
5. *Germ Meal*—			
Oil . . .	6·63	5·95	7·27
Albuminoids . .	24·11	23·65	24·28
Carbohydrates . .	62·54	62·98	61·51
Woody Fibre . .	2·73	3·36	2·67
Ash . . .	3·99	4·06	4·27

TABLE III.—Continued.

WHITE STAND UP.—1909.

Percentages Calculated on Dry Matter.

	Centre.		
	Malone.	Tennant.	Wright.
	%	%	%
1. *Whole Grain*—			
Oil . . .	1·50	1·84	2·53
Albuminoids . .	11·82	11·48	11·23
Carbohydrates . .	82·98	82·96	82·28
Woody Fibre . .	1·97	2·12	2·28
Ash . . .	1·73	1·60	1·68
2. *Flour*—			
Oil . . .	1·08	1·17	·93
Albuminoids . .	10·95	10·89	10·65
Carbohydrates . .	87·38	87·46	87·85
Woody Fibre . .	—	—	—
Ash . . .	·59	·48	·57
3. *Bran*—			
Oil . . .	2·90	3·33	3·41
Albuminoids . .	15·29	15·71	15·18
Carbohydrates . .	63·02	61·53	63·02
Woody Fibre . .	12·46	12·61	11·90
Ash . . .	6·33	6·82	6·49
4. *Pollard*—			
Oil . . .	4·40	4·49	3·83
Albuminoids . .	16·88	16·83	16·09
Carbohydrates . .	68·20	68·56	70·88
Woody Fibre . .	6·43	5·84	5·14
Ash . . .	4·09	4·28	4·06
5. *Germ Meal*—			
Oil . . .	5·92	7·36	6·76
Albuminoids . .	21·56	20·56	22·59
Carbohydrates . .	65·88	65·71	63·95
Woody Fibre . .	2·64	2·10	2·51
Ash . . .	4·00	4·27	4·19

TABLE III.—Continued.

SQUARE HEAD MASTER.—1909.

Percentages Calculated on Dry Matter.

	Centre.		
	Malone.	Tennant.	Wright.
	%	%	%
1. *Whole Grain*—			
Oil . . .	1·76	1·57	1·48
Albuminoids . .	12·64	12·72	12·21
Carbohydrates . .	81·52	82·02	82·78
Woody Fibre . .	2·42	1·93	1·78
Ash . . .	1·66	1·76	1·75
2. *Flour*—			
Oil . . .	·55	·60	·52
Albuminoids . .	11·29	11·06	10·80
Carbohydrates . .	87·58	87·80	88·22
Woody Fibre . .	—	—	—
Ash . . .	·58	·54	·46
3. *Bran*—			
Oil . . .	4·22	3·96	4·68
Albuminoids . .	16·81	16·06	15·88
Carbohydrates . .	62·52	60·64	62·43
Woody Fibre . .	9·16	12·16	9·78
Ash . . .	7·29	7·18	7·23
4. *Pollard*—			
Oil . . .	5·03	4·34	4·31
Albuminoids . .	16·15	16·08	15·27
Carbohydrates . .	69·04	69·56	70·71
Woody Fibre . .	5·99	6·08	6·18
Ash . . .	3·79	3·94	3·53
5. *Germ Meal*—			
Oil . . .	8·19	8·43	8·42
Albuminoids . .	25·19	24·87	25·20
Carbohydrates . .	59·36	59·45	59·42
Woody Fibre . .	2·87	2·92	2·70
Ash . . .	4·39	4·33	4·26

The results of the analyses may be considered (1) in regard to the general composition of each product, and (2) in regard to the variations in composition, if any, which may exist, due to variety, place-effect, i.e., conditions of soil and climate under which the wheat was grown, and milling technique.

General Composition of Wheat and Milling Offals.

The general composition of wheat grain, flour, bran, pollard, and germ meal, as shown by the figures above, is as follows :—

	On Dry Matter.				
	Oil.	Albuminoids.	Carbohydrates.	Fibre.	Ash.
	%	%	%	%	%
Wheat Grain .	2·00	13·75	80	2·5	1·75
Flour .	·75	12·75	86	0·0	·50
Bran .	4·00	15·00	61	12·0	7·00
Pollard .	4·50	16·00	68	5·5	4·00
Germ Meal .	7·00	22·00	62	2·7	4·20

The composition of *Flour*, as compared with the wheat from which it was derived, shows the following changes: decreases in the percentages of oil, albuminoids and ash, the elimination of fibre, and an increase in the percentage of carbohydrates.

Bran is characterised by relatively higher percentages of oil, albuminoids, fibre, and ash, and a substantially lower percentage of carbohydrates than is present in either the original grain or in the flour derived therefrom.

Pollard is differentiated from bran, as might be anticipated from what has been stated above, by higher percentages of carbohydrates and albuminoids and lower percentages of fibre and ash.

Germ Meal is characterised by high percentages of oil and albuminoids; in carbohydrates it approximates to bran, in fibre to the original grain, and in ash to pollard.

The following Tables, IV and V, show the results of 1908, and the average of the results from three centres in 1909.

TABLE IV.

1908.

Percentages Calculated on Dry Matter.

	Red Fife.	White Queen.	White Stand Up.	Sq. Hd. Master.
	%	%	%	%
1. *Whole Grain—*				
Oil . .	1·65	1·67	1·37	1·57
Albuminoids .	14·13	12·47	10·51	11·38
Carbohydrates	79·60	82·29	83·83	82·90
Woody Fibre .	2·35	1·79	2·58	2·28
Ash . .	2·27	1·78	1·71	1·87
2. *Flour—*				
Oil .	1·00	·75	·99	·43
Albuminoids .	15·58	11·39	10·33	11·43
Carbohydrates	82·71	87·33	88·09	87·13
Woody Fibre .	·09	·06	·06	·06
Ash . .	·62	·47	·53	·95
3. *Bran—*				
Oil . .	4·84	3·58	2·72	3·22
Albuminoids .	16·02	15·24	14·93	17·46
Carbodydrates	62·17	64·14	66·26	61·92
Woody Fibre .	0·27	10·73	10·29	10·65
Ash . .	6·70	6·31	5·80	6·75
4. *Pollard—*				
Oil . .	4·98	4·74	3·50	3·87
Albuminoids .	18·43	16·28	15·25	16·15
Carbohydrates	67·73	71·22	73·59	73·00
Woody Fibre .	4·37	4·56	4·65	3·83
Ash . .	4·49	3·20	3·01	3·15
5. *Germ Meal—*				
Oil . .	7·93	8·17	6·66	7·53
Albuminoids .	26·08	26·08	21·16	24·33
Carbohydrates	59·39	59·00	65·00	60·16
Woody Fibre .	2·32	2·49	2·81	3·83
Ash . .	4·28	4·26	4·37	4·15

TABLE V.

Averages for Three Centres, 1909.

Percentages Calculated on Dry Matter.

	Red Fife.	White Queen.	White Stand Up.	Sq. Hd. Master.
	%	%	%	%
1. *Whole Grain*—				
Oil . .	2·06	1·85	1·96	1·60
Albuminoids .	14·25	11·57	11·51	12·52
Carbohydrates .	79·13	82·25	82·74	82·12
Woody Fibre .	2·65	2·66	2·12	2·04
Ash . .	1·91	1·67	1·67	1·72
2. *Flour*—				
Oil . .	·91	·60	1·06	·56
Albuminoids .	13·21	10·76	10·83	11·05
Carbohydrates	85·29	88·19	87·56	87·87
Woody Fibre .	—	—	—	—
Ash . .	·59	·45	·55	·52
3. *Bran*—				
Oil . .	4·70	4·10	3·21	4·29
Albuminoids .	14·63	15·25	15·39	16·25
Carbohydrates	61·57	62·42	62·53	61·86
Woody Fibre .	12·24	11·21	12·32	10·37
Ash . .	6·86	7·02	6·55	7·23
4. *Pollard*—				
Oil . .	4·88	4·81	4·24	4·56
Albuminoids .	18·43	16·53	16·60	15·83
Carbohydrates	66·83	68·60	69·21	69·78
Woody Fibre .	5·41	5·33	5·80	6·08
Ash . .	4·45	4·73	4·15	3·75
5. *Germ Meal*—				
Oil . .	8·08	6·62	6·68	8·35
Albuminoids .	21·34	24·01	21·57	25·09
Carbohydrates	62·72	62·34	65·18	59·40
Woody Fibre .	3·83	2·92	2·42	2·83
Ash . .	4·03	4·11	4·15	4·33

Comparison of Varieties.

Regarding the grain and flour first—it will be seen that, excepting Red Fife, the varieties, resemble each other in composition very closely Red Fife grain shows an appreciably higher albuminoid, a lower carbohydrate, and a slightly higher ash content than the other three varieties. These characteristics are reflected in the composition of the flour, which is again higher in albuminoids and lower in carbohydrates, whilst the ash is barely significantly higher than that of two of the other varieties. The bran of Red Fife is lower in albuminoids and carbohydrates than the three other wheats. As the albuminoid matter is present in the grain intimately mixed with the carbohydrates of the endosperm, the slightest fall in the latter would cause a corresponding decrease in the former.

This is further illustrated in the pollards, where the oil, fibre and ash are approximately the same for all varieties, but here again the presence of a smaller quantity of the carbohydrates of a strong flour carries with it a larger quantity of albuminoid matter.

Variation in Composition of Grain, due to "Place-Effect."

For a consideration of the effect on the four varieties under discussion of different soils and of climate, reference may be made in Tables III. and IV. to "Whole Grain." It should be mentioned that the seed of each variety for the three experimental centres was obtained from one bulk, and consequently differences due to the place of origin of the seed were eliminated.

It will be observed that the composition of the grain of each variety from the three centres is strikingly similar, especially in regard to carbohydrates and albuminoids. Each wheat possesses a composition, peculiar to itself, upon which the nature of the soil and of the climate of the locality in which it was grown appear to exert no influence.

Conclusions.

(1) It has been shown that differences in the composition of the grain of the four wheats under discussion do exist, and are the direct cause of differences noted in the flour and offals obtained from the varieties after milling.

(2) The composition of bran is largely dependent on the extent to which the skin of the grain is capable of being cleaned of closely

adhering endosperm. In the case of a "strong" wheat i.e., one characterised by high albuminoid content, a smaller quantity of the retained flour will result in a correspondingly higher percentage of albuminoids.

(3) The composition of pollard is determined mainly by the amount of bran abstracted and the extent to which this is replaced by flour.

(4) These investigations show that under the conditions of the trials the composition of the grain of the four varieties is unaffected by differences of soil and geographical position of the experimental centres.

(5) There is no difference in the composition of the bran and pollards of the two red and two white wheats dealt with in this report, viz.: red—Red Fife and Square Head Master; white—White Queen and White Stand Up. On the basis of chemical composition these results therefore lend no support to the view that white bran is a better feeding material than red bran.

(6) In some cases the germ meal is not separated from the bran and pollard during milling, when, on account of its richness in oil and albuminoids, the proportion in which it occurs in these two products must exert a considerable effect on their ultimate composition.

H. HUNTER.

FLAX EXPERIMENTS, 1913.

I.—MANURIAL EXPERIMENTS.

A.—General.

The following is a summary of the results obtained from the three series of experiments conducted by the Department during each of the twelve years 1901 to 1912 inclusive* :—

(1) The use of potassic manures, e.g., kainit, muriate of potash, and sulphate of potash, gave profitable increases; kainit and muriate of potash, which showed almost equal merits, gave better results than sulphate of potash.

(2) The winter application of kainit, and also of muriate of potash gave almost similar results to those obtained when these manures were applied at time of sowing. The time for applying either of these manures may, therefore, be left to the convenience of growers.

(3) Phosphatic manures applied either singly, in combination with a potash manure, or as part of a complete mixture, encouraged the growth of weeds at the expense of the flax, and their use was almost invariably attended with a loss, and very frequently even with smaller yields of scutched flax.

(4) The application of agricultural salt was not remunerative.

(5) Profitable increases were in many instances obtained from the slow-acting nitrogenous manure, rape meal when used in conjunction with kainit. The results, however, varied to such a degree in different centres, and in different seasons, that the use of this mixture could not be recommended in preference to dressings of either kainit or muriate of potash.

(6) The addition of the nitrogenous manure sulphate of ammonia to muriate of potash, gave on the average of all centres profitable increases in three seasons out of four. Owing to the variations in the results obtained at different centres and in different seasons it was not possible to make a definite recommendation as to the use of sulphate of ammonia.

* For 1st series see Journal, Vol. II, pp. 636 et seq.; Vol. III, pp. 663 et seq.; Vol. IV, pp. 616 et seq.; Vol. V, pp. 449 et seq.
For 2nd series see Journal, Vol. VII, pp. 250 et seq.; Vol. VIII, pp. 423 et seq.; Vol. IX, pp. 270 et seq.; Vol. X, pp. 279 et seq.
For 3rd series see Journal, Vol. XI, pp. 327 et seq.; Vol. XII, pp. 502 et seq.; Vol. XIII, pp. 515 et seq.; Vol. XIV, pp. 515 et seq.

In view of these results, the fourth series of experiments was designed to afford further information on the effect of sulphate of ammonia, both when used alone, and in conjunction with muriate of potash. It was also considered advisable to compare the effect of a dressing of 1½ cwt. muriate of potash per statute acre with that of an application of 1 cwt. which had been taken as a standard in the four previous years' experiments.

The 1913 experiments, therefore, comprised plots treated as follows per statute acre:—

Plot 1. Unmanured.
Plot 2. ½ cwt. Sulphate of Ammonia.
Plot 3. { 1½ cwt. Muriate of Potash. ½ cwt. Sulphate of Ammonia. }
Plot 4. { 1 cwt. Muriate of Potash. ½ cwt. Sulphate of Ammonia. }
Plot 5. 1½ cwt. Muriate of Potash.
Plot 6. 1 cwt. Muriate of Potash.

The trials were carried out at ten centres in the district around Magherafelt. The plots were each one-tenth statute acre in extent, and, as in previous years, all the operations connected with the experiments were supervised by officers of the Department. The scutched flax was valued at Belfast by three buyers, who kindly placed their services at the disposal of the Department for the purpose.

A continuous spell of wet weather, which lasted from early in April until the second week in May, prevented sowing operations being carried out during that period except at a few centres where the soil was exceptionally dry. Most of the plots were sown during the second and third week in May in showery weather, and with the seed bed in wet condition. During the two succeeding months the weather was rather dull and moist, but without an excessive rainfall. Very healthy brairds were obtained at all centres, but, owing to cold weather, they made slow progress at the start. After the advent of warm weather in the middle of June, the crop made very rapid and uninterrupted progress. The entire period from the middle of July to the middle of September was extremely dry and warm, and pulling operations were carried out under most favourable conditions. Though flax-growers in general suffered from a scarcity of water, no difficulty was experienced in securing suitable ponds for the produce of the plots. The retting operations were carried out satisfactorily, and the retted flax was secured in excellent condition.

Dutch Riga Child seed was sown on each plot at the rate of 56 quarts per statute acre. The dates of sowing the manures and seed, and of the pulling of the flax are shown in the following statement:—

Centre.	Date of Sowing, 1913.		Date of Pulling, 1913.	
Robert Millar, Greenhall, Castledawson .	May	5th	Aug.	14th
David McClure, Artlone, Randalstown .	,,	20th	,,	26th
John Ferguson, The Hermitage, Ballyronan .	,,	13th	,,	25th
Joseph Brown, Ballynagowan, Desertmartin .	April	23rd	,,	13th
Hugh Cudden, Killyneece, Castledawson .	May	16th	,,	28th
John Ekin, Ballygillen, Moneymore .	,,	15th	,,	29th
Patrick McErlean, Knockloughrim .	,,	5th	,,	18th
James Ferguson, Ballynagarve, Magherafelt .	,,	14th	,,	26th
Patrick Vaughan, Bellaghy . . .	,,	12th	,,	18th
William Pearce, Ballygrubby, Moneymore .	,,	16th	,,	29th

The following observations were made on the various plots during the growing and ripening periods :—

Plot I. (Unmanured).—At most centres the brairds at the start were promising, but at an early stage they suffered very severely from "yellowing," and for a considerable period made very little progress. The crop began to revive rapidly towards the end of June, but the effect of the yellowing in producing a short uneven growth of flax was quite visible at pulling time.

Plot II. (Sulphate of Ammonia).—This plot yellowed quite as badly as Plot I., but during the later stages of growth it made a better recovery and produced a larger bulk of flax straw.

Plots III. and IV. (Muriate of Potash with Sulphate of Ammonia).—The brairds were very healthy and free from yellowing. The subsequent growth was extremely vigorous and resulted in a crop of flax which was more bulky and of a darker colour than on any of the remaining plots.

Plots V. and VI. (Muriate of Potash).—There was a complete absence of yellowing on these plots. The flax made steady and rapid growth throughout the season. The crop on Plot V., which received the heavier dressing of muriate of potash was distinctly more vigorous in growth than that grown on Plot VI.

The average returns from each plot at the ten centres are given in Table I. (pp. 576-577).

Effect of Sulphate of Ammonia used alone.

Scutched flax per statute acre from unmanured plot	33st. 13lb.
Scutched flax per statute acre from ½ cwt. sulphate of ammonia (Plot 2) ..	37st. 10lb.
Estimated profit per statute acre from use of ½ cwt. sulphate of ammonia ..	£1 4*s.* 3*d.*

The effect of applying ½ cwt. sulphate of ammonia per statute acre was to increase the yield of flax straw at each of the ten centres, and of scutched flax at eight centres. A profitable increase of fibre was also obtained at eight centres. Taking the average results, a higher yield of 3st. 11lb. of scutched flax per statute acre resulted from the application of sulphate of ammonia, which left a profitable increase of £1 4*s.* 3*d.* after deducting the cost of the manures.

As this is the first year in which the effect of sulphate of ammonia used alone was tested, the results of further experiments must be awaited before any definite conclusion can be arrived at as to the merits of such a dressing.

Effect of Muriate of Potash used alone.

Scutched flax per statute acre from unmanured plot	33st. 13lb.
Scutched flax per statute acre from 1½ cwt. muriate of potash (Plot 5) ..	42st. 5lb.
Estimated profit per statute acre from use of this dressing	£3 0*s.* 1*d.*
Scutched flax per statute acre from 1 cwt. muriate of potash (Plot 6) ..	40st. 11lb.
Estimated profit per statute acre from use of this dressing	£2 12*s.* 4*d.*

A profitable increase was obtained at nine of the ten centres from the dressing of muriate of potash applied to plot 5, and at eight centres from that applied to plot 6.

On an average, after deducting the cost of the manure, profits of £3 0*s.* 1*d.* and £2 12*s.* 4*d.* per statute acre were obtained from the use of dressings of 1½ cwt. and 1 cwt. of muriate of potash respectively.

These results are in accordance with those of previous years experiments, and provide striking evidence as to the value of muriate of potash as a dressing for the flax crop.

Effect of Different Mixtures of Muriate of Potash and Sulphate of Ammonia.

Plots 3 and 4 were dressed with different combinations of these manures.

Scutched flax per statute acre from unmanured plot	33st. 13lb.
Scutched flax per statute acre from 1½ cwt. muriate of potash and ½ cwt. sulphate of ammonia (Plot 3)	46st. 4lb.
Estimated profit per statute acre from use of this mixture	£3 12*s.* 0*d.*

Scutched flax per statute acre from 1 cwt. muriate of potash and ½ cwt. sulphate of ammonia (Plot 4) .. .. 43st. 13lb.
Estimated profit per statute acre from use of this mixture .. .. .. £3 6*s*. 0*d*.

A profitable increase was obtained at ten centres from the mixture applied to plot 3, and at nine of the ten centres from the mixture applied to plot 4. The average returns from all centres show that after deducting the cost of manures, profits of £3 12*s*. 0*d*. and £3 6*s*. 0*d*. per statute acre were realised from the mixtures used on plots 3 and 4 respectively.

As compared with the results from muriate of potash alone, larger yields both of retted straw and of scutched flax were obtained at most of the centres from the use of these mixtures. Taking the average results, the addition of ½ cwt. of sulphate of ammonia to dressings of 1½ cwt. and 1 cwt. muriate of potash has given increased profits of 11*s*. 11*d*. and 13*s*. 8*d*. per statute acre respectively.

These results, when taken in conjunction with those obtained in the four preceding years' experiments, go to show that in most seasons the addition of a light dressing of sulphate of ammonia to muriate of potash would prove remunerative.

Effects of Varying Quantities of Muriate of Potash.

These are shown in the following tabulated statements :—

(*a*) muriate of potash used in combination with sulphate of ammonia.

Plot.	Manures applied per statute acre.	Yield of scutched flax per statute acre.	Estimated profit per statute acre from use of manures.
		st. lb.	£ *s*. *d*.
3	1½ cwt. Muriate of Potash ½ cwt. Sulphate of Ammonia	46 4	3 12 0
4	1 cwt. Muriate of Potash ½ cwt. Sulphate of Ammonia	43 13	3 6 0

(*b*) muriate of potash used alone.

Plot.	Manures applied per statute acre.	Yield of scutched flax per statute acre.	Estimated profit per statute acre from use of manures.
		st. lb.	£ *s*. *d*.
5	1½ cwt. Muriate of Potash . .	42 5	3 0 1
6	1 cwt. Muriate of Potash . .	40 11	2 12 4

Both when used in combination with sulphate of ammonia and when used alone more remunerative results have on the average been obtained from the application of 1½ cwts. muriate of potash than from that of 1 cwt. muriate of potash per statute acre.

As this is the first year in which the effects of varying quantities of muriate of potash have been tested, the results of further experiments must be awaited before any reliable conclusions can be drawn as to the respective merits of these two dressings.

B.—Liming Experiments.

In some districts it is a well recognised practice among experienced flax-growers to lime land in preparation for the subsequent year's flax crop. Experiments to test the value of this practice were carried out in 1912, lime having been applied on the plots at the rate of 1 ton per statute acre in 1911. The results of these trials were published in Vol. XIV., No. 3, of the Department's Journal. In 1913 similar experiments, except that the rate of liming was 2 tons per statute acre, were repeated at two centres in County Donegal. In each centre there were four plots, one-eighth of a statute acre each in extent. After the application of lime in 1912 all the plots were cropped with oats, and in 1913 with flax.

The treatment of the respective plots per statute acre was as follows :—

		1912	1913
Plot.		Crop.—Oats.	Crop.—Flax.
1	..	No lime	No Muriate of Potash.
2	..	No lime	1 cwt. Muriate of Potash.
3	..	2 tons burnt lime	No Muriate of Potash.
4	..	2 tons burnt lime	1 cwt. Muriate of Potash.

The lime was applied to the ploughed land previous to the seed bed for the oats being prepared. The oat crop grown on the limed plots (3 and 4) in 1912 was apparently superior to that grown on the unlimed plots (1 and 2), but the produce was not separately threshed. The muriate of potash was applied at the time of sowing the flax in 1913.

The brairds on plots 1 and 3 which were not dressed with muriate of potash suffered from "yellowing," and the flax made an uneven growth. In contrast to this the brairds on plots 2 and 4, to which muriate of potash was applied, were quite healthy, and the subsequent growth of the flax uniform.

The average yields of flax and financial returns from each plot, at the two centres, are given in Table II. (pp. 578-579). In this table the flax crop is debited with only one-quarter of the cost of the lime, i.e., at the rate of 5*s*. per ton. This proportion is, of course, based on the assumption that the other crops in the rotation will benefit from the dressing of lime. Though there exists no experimental data which might be applied to these trials as to the effect of lime on the various crops throughout the rotation, it may safely be assumed that the charge of one-fourth of the cost to the flax crop is, if anything, too high a proportion.

The comparative results obtained at the two centres are fairly uniform, and show that at both centres very profitable increased yields of retted straw and of scutched flax were obtained from the dressings of lime alone and of lime and muriate of potash used on plots 3 and 4 respectively. The dressing of muriate of potash alone on plot 2 resulted in a slightly increased yield of scutched flax at both centres.

Taking the average returns, the various dressings gave when compared with the untreated plot the following increased yields of scutched flax: muriate of potash (Plot 2) 1 st. 2 lb.; lime (Plot 3) 7 st. 10 lb.; lime and muriate of potash (Plot 4) 12 st.

A comparison of the financial results obtained in these and in the preceding year's experiments from the various dressings are shown in the following table:—

Treatment per statute acre.	Profit per statute acre from use of manures. 1912.	1913.
	£ *s.* *d.*	£ *s.* *d.*
1 cwt. Muriate of Potash . . .	1 13 3	0 6 0
1 ton lime (1912 trials) 2 tons lime (1913 trials)	2 2 1	2 9 10
1 ton lime (1912 trials) 2 tons lime (1913 trials) and 1 cwt. Muriate of Potash	3 17 0	4 0 4

In both years' trials the results show a fair degree of correspondence. The dressings of lime alone have in each year proved more remunerative than muriate of potash alone, while much better results have been obtained from these manures used in combination.

The practice of liming land one year in advance in preparation for flax finds strong support in the results obtained in these trials. Before, however, definite recommendations can be made as to the use of lime for the flax crop, it will be necessary to carry out further experiments.

II.—SEED TRIALS.

A.—Variety Tests.

I. General.

Each year since 1901 experiments have been conducted, in which seed imported by the Department directly from Holland and Russia has been tested against brands of Dutch and Russian seed imported by Ulster merchants. The results of these trials are given in the following table:—

	Russian Seed Imported by the Department.	Belfast Brand of Riga Seed.	Dutch Seed Imported by the Department.	Belfast Brand of Dutch Seed.
1901				
Yield of Scutched Flax per st. acre	45 st. 6 lb.	43 st. 4 lb.	44 st. 4 lb.	43 st. 5 lb.
Total Returns per st. acre	£18 4 11	£17 11 3	£17 5 0	£17 1 5
1902				
Yield of Scutched Flax per st. acre	39 st. 10 lb.	38 st. 3 lb.	34 st. 9 lb.	36 st. 1 lb.
Total Returns per st. acre	£15 16 1	£14 12 11	£13 12 3	£13 16 6
1903				
Yield of Scutched Flax per st. acre	Not tested	9 st. 3 lb.	14 st. 13 lb.	15 st. 8 lb.
Total Returns per st. acre		£3 17 1	£6 11 4	£6 14 1
1904				
Yield of Scutched Flax per st. acre	21 st. 12 lb.	21 st. 6 lb.	24 st. 6 lb.	23 st. 5 lb.
Total Returns per st. acre	£9 10 1	£9 8 0	£10 12 2	£10 5 10
1905				
Yield of Scutched Flax per st. acre	32 st. 4 lb.	24 st. 6 lb.	34 st. 4 lb.	34 st. 6 lb.
Total Returns per st. acre	£14 0 8	£10 1 9	£14 8 0	£14 12 0
1906				
Yield of Scutched Flax per st. acre	33 st. 8 lb.	31 st. 4 lb.	36 st. 7 lb.	37 st. 4 lb.
Total Returns per st. acre	£12 19 7	£12 4 9	£13 15 1	£14 8 7
1907				
Yield of Scutched Flax per st. acre	37 st. 12 lb.	34 st. 11 lb.	37 st. 12 lb.	33 st. 8 lb.
Total Returns per st. acre	£12 19 9	£11 18 8	£13 0 4	£11 2 6
1908				
Yield of Scutched Flax per st. acre	41 st. 8 lb.	37 st. 6 lb.	37 st. 6 lb.	35 st. 6 lb.
Total Returns per st. acre	£14 17 0	£13 9 7	£12 13 10	£12 1 11
1909				
Yield of Scutched Flax per st. acre	34 st. 8 lb.	30 st. 8 lb.	37 st. 12 lb.	32 st. 6 lb.
Total Returns per st. acre	£14 2 7	£12 12 0	£15 14 8	£13 1 1
1910				
Yield of Scutched Flax per st. acre	37 st. 11 lb	40 st. 5 lb.	37 st. 12 lb.	33 st. 12 lb.
Total Returns per st. acre	£18 19 1	£21 3 8	£19 7 7	£17 2 11
1911				
Yield of Scutched Flax per st. acre	39 st. 5 lb.	A 35 st. 0 lb. B 36 st. 5 lb.	36 st. 11 lb.	32 st. 3 lb.
Total Returns per st. acre	£16 5 10	A £14 6 7 B £15 3 4	£15 5 2	£12 2 5
1912				
Yield of Scutched Flax per st. acre	35 st. 1 lb.	34 st. 0 lb.	38 st. 0 lb.	36 st. 1 lb.
Total Returns per st. acre	£14 16 9	£14 12 3	£15 9 9	£14 12 8
Average Returns per st. acre excluding year 1903	£14 15 8	£13 18 9	£14 13 0	£13 13 5

The general plan of the seed trials in 1913 was similar to that carried out in previous years, as shown in the foregoing table.

The following kinds of seeds were compared :—

RUSSIAN (1) Pernau Crown, imported by the Department.
(2) Riga brand, purchased in Ulster.

DUTCH (1) Riga Child, imported by the Department.
(2) A brand purchased in Ulster.

IRISH (1) Produce of three successive years' selection from long stalks of flax.

The plots, which were one-tenth of an acre in extent, were laid down at the same centres at which the manurial experiments were carried out, and were manured with muriate of potash at the rate of 1 cwt. per statute acre. The Russian and Irish seed was sown at the rate of 60 quarts per statute acre, and the Dutch seed at 55 quarts. The supervision of the experiments and the valuation of the scutched flax were carried out according to the procedure adopted in connection with the manurial experiments.

Full particulars of the average returns from each variety of seed at the ten centres are given in Table III. (pp. 580-581).

The brairds on all the plots were healthy and of uniform thickness, but that from Dutch Riga Child was exceptionally vigorous, and at pulling time the crop of flax grown from this variety was distinctly superior to that of any of the other varieties. The flax from Dutch seed purchased in Ulster was, when mature, rather short and irregular in growth but was considerably superior to that grown from Irish seed.

At nine of the ten centres Dutch Riga Child produced the largest yield of scutched flax of all the varieties tested. When compared with locally purchased Dutch seed it shows, on an average of all centres, a higher yield of 8st. 3lb. of scutched flax, and a larger monetary return of £3 6*s*. 4*d*. per statute acre.

As between the two Russian varieties larger yields of scutched flax were obtained at eight of the ten centres from Pernau Crown than from the Riga seed purchased in Ulster. On an average a difference is shown of 2st. 9lb. in the yield of scutched flax, and of £1 3*s*. 3*d*. in the monetary return in favour of Pernau Crown. Although poorer results were obtained from either of these Russian seeds than from Dutch Riga Child they both proved superior to the Dutch seed locally purchased.

The Irish-saved seed was slower in brairding and the crop subsequently made a less vigorous growth than that of any of the other varieties. There was a very large proportion of dead and wilted stalks observed in the crop at pulling time. At all centres the Irish seed produced the smallest yields of retted straw and

scutched flax, and on an average a very much smaller financial return than was obtained from any of the imported seeds.

A study of these results in conjunction with those of previous years affords conclusive proof that the choice of the variety of flax seed to be sown (i.e., whether Dutch or Russian) should not be governed either by the class of soil or by the district for which it is intended, but by the quality of the seed itself. For example, in this year's trials, of the two brands of Dutch seed tested, one gave better, and the other poorer results, than were obtained from either of the two classes of Russian seed. Again, while in the 1910 and 1911 trials Russian seeds gave the better average results on various classes of soils, Dutch seed was most productive in 1909 and in 1912. Moreover, these four years' trials were carried out in districts in Counties Donegal and Tyrone, in which Russian seed is, year after year, almost exclusively sown. Farmers should, therefore, before purchasing their seed, consult the leaflet on Flax Seed (No. 29), published by the Department, and revised annually, which gives information as to the harvest conditions prevailing in the two seed producing countries, Holland and Russia, during the previous year, and affords guidance as to the quality of seed obtainable from each.

II.—Special.

In these trials seed obtained from several of the more easterly flax growing districts in Russia and three different classes of Irish-saved seed were compared with Pernau Crown and Dutch Riga Child. An additional plot was included, and this was sown with Pernau Crown seed of 1911 growth, i.e., old seed.

The experiments were conducted at four centres, but at one of these the trial had to be abandoned owing to the flax being damaged by a flood during retting time. The size of each plot was one-tenth statute acre.

As a standard rate of seeding Pernau Crown (new seed), which gave a germination of 91 per cent., was sown at the rate of 60 quarts per statute acre, and the remaining varieties, after allowing for their germinating qualities, were sown correspondingly thick.

Oughlitch seed was very small in the pickle and gave a germination of only 60 per cent. The remaining special Russian seeds were of a fair quality, germinating from 86 to 92 per cent. Pernau Crown seed (1911 growth) had been very carefully stored and gave as high a germination as the new seed of this variety. The Irish-saved seed was also of fair quality.

The rapidity of brairding of the different seeds varied considerably. Irish-saved seed and Pernau Crown (old seed), were the slowest, and were almost two days later in brairding than Dutch Riga Child. The brairds from Oughlitch seed were rather thick, and this after-

wards interfered with the growth of the crop. All the brairds were healthy. The flax from the various kinds of Irish-saved seed made relatively slow progress, and at pulling time was comparatively short and contained a large proportion of dead and wilted stalks. On the remaining plots the flax made a vigorous growth throughout the whole of the growing season.

The supervision of these trials was exercised by officers of the Department, and the valuation of the scutched flaxes was carried out similarly to that of the produce of the manurial and general variety tests. The average returns from the different varieties of seed at three centres are given in Table IV. (pp. 582-583).

The comparative yields of the various Russian seeds and of Dutch Riga Child varied considerably at the different centres. When the average results are taken it is seen that the largest monetary returns have been obtained from the standard varieties of seed, i.e., Pernau Crown and Dutch Riga Child.

Pernau Crown (old seed) gave slightly better results than the new seed of this variety.

The yields of retted straw and of scutched flax from the various classes of Irish-saved seed were almost without exception at the different centres lower than those obtained from any of the other varieties, and the average financial returns from the Irish seed were disappointing. Further, it may be noted that the selected seed saved from long stalks gave poorer results than unselected seed from the general crop.

B.—Selection of Seed.

Large Scale Experiments.

In continuation of the experiments carried out in 1911 and in 1912, further trials were made in 1913, to test whether by making in successive years a selection of seed from long stalks the flax plant could be improved for fibre production. For the purpose of the experiment three fields were rented in Limavady district, and the following classes of seed were sown on adjoining plots in each field :—

1. Seed the produce of three successive years' selection from long stalks, commencing with a crop grown from Pernau Crown seed in 1910. This seed is referred to in this report as "3rd year selected."

2. Seed the produce of three successive years' selection as in (1),

but from a specially careful selection of long stalks. This seed is afterwards referred to as "Special selected."

3. Pernau Crown seed directly imported in 1913.

In 1910 and 1911 the long stalks were selected out of the growing crop at pulling time. The special selection was made by pulling long individual plants singly as the general work of pulling proceeded; in the case of the ordinary selections the long stalks were pulled in handfuls and comprised about one-third of the crop. In 1912 these methods of selection could not be followed owing to the flax being very badly lodged. A general selection was, therefore, made at the time of rippling by carefully straightening the flax, squaring the root ends of each handful, and then rippling off for sowing purposes the seeds from the long stalks only.

The Irish seed was plump and showed a germination of 88 to 90 per cent., and the Pernau Crown of 91 per cent. All the varieties were sown at the rate of 54 quarts per statute acre.

In comparison with Pernau Crown both kinds of Irish seed were almost two days slower in brairding. All the brairds were healthy and of uniform thickness, but in each of the fields the flax from Pernau Crown seed made the quickest growth, though at pulling time the difference between this variety and specially selected was scarcely noticeable. The crop grown from 3rd year's selected seed became badly affected by wilting, whereas that from specially selected seed remained comparatively free from this disease, and at pulling time was almost as healthy as the Pernau Crown crop.

For purposes of comparison three adjoining plots of one-quarter of a statute acre each, which were representative of the crops grown from the various seeds, were measured off in one of the fields and pulled, retted, and scutched separately. The three lots of scutched flax were forwarded to a firm of spinners for valuation, and those grown from specially selected and Pernau Crown seed were submitted to a spinning test.

The following is a tabulated statement showing the returns obtained from these two latter varieties:—

	Specially Selected Irish Seed.	Pernau Crown Seed.
Yield of dried retted Straw per st. acre	27 cwt. 1 qr. 2 lb.	27 cwt. 3 qr. 16 lb.
Yield of scutched Flax per st. acre	32 st. 12 lb.	36 st. 0 lb.
Percentage of scutched Flax from retted Straw	14·95	16·13.
Value of scutched Flax per cwt. based on value of line produced	52s. 2d.	61s.
Value of scutched Flax per st. acre	£10 14s. 4d.	£13 14s. 6d.

The yields of retted straw of the two varieties are approximately equal. The flax grown from specially selected seed gave, however, inferior results both in scutching and in spinning, so that in point of monetary return it was worth £3 0*s.* 2*d.* per statute acre less than that grown from Pernau Crown.

The 3rd year selected seed yielded only 22 cwts. 3 qrs. of dried retted straw and 28 stones of scutched flax per statute acre. The firm of spinners to whom the flax was submitted for valuation reported that it was much poorer in quality than that grown from specially selected seed. No test was, therefore, made of its spinning quality.

It may be noted that in similar trials conducted in each of the previous two years, specially selected Irish seed of the same strain gave in 1911 superior, and in 1912 only slightly inferior results to Pernau Crown. The fact, therefore, that in 1913 results so poor have been obtained both from the specially selected and from the 3rd year's selected seed may, perhaps, indicate that these strains of seed lose their original vigour when grown for successive generations in this country.

By the adoption of methods followed in these trials it does not appear hopeful that it will be possible in this country to improve the flax plant for fibre production by making in successive years a selection of seed from long stalks.

The improvement of the flax crop by propagation from selected plants is being made the subject of a special investigation by the Department's Plant Breeding Division, and a report on the progress of this work was published in the Department's JOURNAL (Vol. XV., No. 2).

The general results already obtained show :—(1) that the flax seed in general cultivation is a mixture of numerous types varying in characteristics, amongst which is length of stalk; (2) that any of these types can be separated, and a strain of flax established showing uniformity of character by propagation from one selected plant; (3) that the produce of a number of selected plants, despite great care in selection, shows considerable variations in type.

[TABLES.

TABLE I.—Showing the Results from the Application

No. of Plot.		1	
Manure applied per Statute Acre.		No Manure.	
Name and Address of Farmer conducting the Experiment.	Character of Soil.	Retted Straw lb.	Scutched Flax lb.
Robt. Millar, Greenhall, Castledawson .	Medium loam ; till subsoil .	3,120	560
David McClure, Artlone, Randalstown .	Dark loam ; clay subsoil .	2,840	520
John Ferguson, The Hermitage, Ballyronan	Medium loam ; clay subsoil	2,540	490
Joseph Brown, Ballynagowan, Desertmartin	Sandy loam ; sandy subsoil	3,000	520
Hugh Cudden, Killyneece, Castledawson	Medium loam ; gravelly subsoil	2,870	560
John Ekin, Ballygillen, Moneymore .	Heavy soil ; red till, and clay subsoil	2,240	370
Patrick McErlean, Knockloughrim .	Medium loam ; red clay subsoil	3,200	565
James Ferguson, Ballynagarve, Magherafelt	Heavy loam ; clay subsoil .	2,100	320
Patrick Vaughan, Bellaghy . .	Light sandy loam ; sandy subsoil	2,240	360
Wm. Pearce, Ballygrubby, Moneymore .	Dark heavy loam ; clay subsoil	2,520	485
Average yield of Retted Straw per statute acre . . .		2,667 lb.	
Average yield of Scutched Flax per statute acre . . .		33 st. 13 lb.	
Percentage of Scutched Flax from Retted Straw . . .		17·81	
Average value of Scutched Flax per stone*		6s. 8d.	
Average returns from Scutched Flax per statute acre . . .		£11 7s. 3d.	
Average returns from Tows per statute acre		7s. 0d.	
Average returns from Flax and Tows per statute acre . .		£11 14s. 3d.	
Cost of Manure		—	
Estimated Profit per statute acre from use of Manures . .		—	

* The Flax grown on each plot at each centre was valued separately.

of Different Manures to the Flax Crop (1913).

2		3		4		5		6	
½ cwt. Sulphate of Ammonia.		1½ cwt. Muriate of Potash, ½ cwt. Sulphate of Ammonia.		1 cwt. Muriate of Potash, ½ cwt. Sulphate of Ammonia.		1½ cwt. Muriate of Potash.		1 cwt. Muriate of Potash.	
Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.
3,670	610	3,590	660	3,580	640	3,430	600	3,500	590
3,120	535	3,500	625	3,360	565	3,150	550	2,870	595
2,840	530	3,550	680	3,920	710	3,780	700	3,640	650
3,440	620	4,100	810	3,640	710	3,620	670	3,520	670
3,240	630	3,570	700	3,480	670	3,360	630	3,010	590
2,380	370	2,760	450	2,500	390	2,870	450	2,580	400
3,240	565	4,130	770	3,740	720	3,710	710	3,670	700
2,610	420	2,820	490	2,830	500	2,400	420	2,380	435
2,830	480	3,820	670	3,800	690	3,610	660	3,620	690
2,660	520	3,240	630	2,820	555	2,770	540	2,590	480
3,003 lb.		3,508 lb.		3,367 lb.		3,270 lb.		3,138 lb.	
37 st. 10 lb.		46 st. 4 lb.		43 st. 13 lb.		42 st. 5 lb.		40 st. 11 lb.	
17·58		18·47		18·26		18·13		18·19	
6s. 10½d.		7s. 0½d.		7s. 0½d.		7s. 1¾d.		7s. 0½d.	
£12 19s. 7d.		£16 3s. 1d.		£15 11s. 8d.		£15 4s. 4d.		£14 10s. 6d.	
6s. 5d.		7s. 2d.		7s. 1d.		6s. 6d.		7s. 1d.	
£13 6s. 0d.		£16 10s. 3d.		£15 18s. 9d.		£15 10s. 10d.		£14 17s. 7d.	
7s. 6d.		£1 4s. 0d.		18s. 6d.		16s. 6d.		11s. 0d.	
£1 4s. 3d.		£3 12s. 0d.		£3 6s. 0d.		£3 0s. 1d.		£2 12s. 4d.	

These figures represent the average of the valuations.

TABLE II.—Showing the Results in 1913 from the application of Lime previous year

No. of Plot.	
Manure applied per statute acre.	
Name and Address of Farmer conducting the Experiment.	Character of Soil.
John Bates, Carnown, Castlefin	Medium loam ; till subsoil
Christy Leitch, Cavanowery, Castlefin	Medium loam
Average yield of Retted Straw per statute acre	
Average yield of Scutched Flax per statute acre	
Percentage of Scutched Flax from Retted Straw	
Average value of Scutched Flax per stone *	
Average returns from Scutched Flax per statute acre	
Average returns from Tows per statute acre	
Average returns from Flax and Tows per statute acre	
Cost of Manure (In case of lime one fourth of the cost)	
Estimated profit per statute acre	

* The flax grown on each plot at each centre was valued separately.

and Muriate of Potash to the Flax Crop, the Lime being applied the
to Lea Oats.

1		2		3		4	
Untreated.		1 cwt. Muriate of Potash.		2 tons burnt Lime.		2 tons burnt Lime 1 cwt. Muriate of Potash.	
Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.
2,352	432	2,520	448	2,688	504	2,776	544
3,024	608	3,008	624	3,360	752	3,920	832
2,688 lb.		2,764 lb.		3,024 lb.		3,348 lb.	
37 st. 2 lb.		38 st. 4 lb.		44 st. 12 lb.		49 st. 2 lb.	
19·34		19·39		20·76		20·55	
7s. 4½d.		7s. 7½d.		7s. 6d.		7s. 7½d.	
£13 11s. 8d.		£14 9s. 8d.		£16 12s. 0d.		£18 13s. 8d.	
6s. 6d.		5s. 6d.		6s. 0d.		5s. 10d.	
£13 18s. 2d.		£14 15s. 2d.		£16 18s. 0d.		£18 19s. 6d.	
—		11s.		10s. 0d.		£1 1s. 0d.	
—		6s.		£2 9s. 10d.		£4 0s. 4d.	

These figures represent the average of the valuations.

TABLE III.—Showing the Returns from Trials

No. of Plot.		1	
Variety of Seed.		Dutch Riga Child, Imported by the Department.	
Name and Address of Farmer conducting the Experiment.	Character of Soil.	Retted Straw lb.	Scutched Flax lb.
Robt. Millar, Greenhall, Castledawson .	Medium loam; tilly, subsoil	3,500	590
David McClure, Artlone, Randalstown	Dark loam; clay subsoil .	2,870	505
John Ferguson, The Hermitage, Ballyronan	Medium loam; clay subsoil	3,640	650
Joseph Brown, Ballynagowan, Desertmartin	Sandy loam; sandy subsoil	3,520	670
Hugh Cudden, Killyneece, Castledawson	Medium loam; gravelly subsoil	3,010	590
John Ekin, Ballygillen, Moneymore .	Heavy soil; red till and clay subsoil	2,580	400
Patrick McErlean, Knockloughrim .	Medium loam; red clay subsoil	3,670	700
James Ferguson, Ballynagarve, Magherafelt	Heavy loam; clay subsoil	2,380	435
Patrick Vaughan, Bellaghy . .	Light sandy loam; sandy subsoil	3,620	690
Wm. Pearce, Ballygrubby, Moneymore	Dark heavy loam; Clay subsoil . .	2,590	480
Average yield of Retted Straw per statute acre . .		3,138 lb.	
Average yield of Scutched Flax per statute acre . .		40 st. 11 lb.	
Percentage of Scutched Flax from Retted Straw . .		18·19	
Average value of Scutched Flax per stone* . . .		7s. 0½d.	
Average returns from Scutched Flax per statute acre . .		£14 10s. 6d.	
Average returns from Tows per statute acre . . .		7s. 1d.	
Average returns from Flax and Tows per statute acre . .		£14 17s. 7d.	

* The Flax grown on each plot at each centre was valued separately.

of Different Varieties of Flax Seed (1913).

2		3		4		5	
Belfast Dutch, Purchased in Ulster.		Irish Saved, 3rd Year's Selection.		Pernau Crown, Imported by the Department.		Belfast Riga, Purchased in Ulster.	
Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.
3,230	540	2,730	430	3,220	570	3,290	570
2,710	465	2,680	425	2,800	505	2,800	455
3,180	570	2,360	350	2,940	550	2,840	570
2,660	470	2,590	440	3,080	560	2,460	450
2,690	490	2,140	390	2,680	520	2,760	500
2,300	320	1,960	260	2,450	380	2,720	360
2,770	510	2,500	440	3,360	680	3,480	670
2,100	305	1,860	280	2,040	350	1,960	320
3,330	580	2,890	380	3,390	600	3,580	540
1,760	310	1,580	265	1,910	355	1,730	270
2,673 lb. 32 st. 8 lb. 17·05 6s. 10d. £11 4s. 9d. 6s. 6d. £11 11s. 3d.		2,329 lb. 26 st. 2 lb. 15·71 6s. 5½d. £8 10s. 6d. 8s. 1d. £8 18s. 7d.		2,787 lb. 36 st. 3 lb. 18 6s. 10d. £12 11s. 7d. 6s. 4d. £12 17s. 11d.		2,762 lb. 33 st. 8 lb. 17 6s. 8d. £11 6s. 11d. 7s. 9d. £11 14s. 8d.	

These figures represent the average of the valuations.

TABLE IV.—Showing the Results of Special

No. of Plot.		1		2		3	
Variety of Seed.		Russian Rjeff.		Russian Oughlitch.		Russian Pskoff.	
Name and Address of Grower.	Character of Soil.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.
Messrs. Duff, Coagh .	Deep loam; sandy clay subsoil	3,640	505	3,440	520	3,850	640
John Stewart, Glenmaquill, Magherafelt	Medium loam; clay subsoil	4,270	650	4,060	590	4,480	650
W. J. Mann, Hillhead, Castledawson	Medium loam; sandy subsoil	3,590	720	3,710	640	3,520	640
Average yield of Retted Straw per statute acre		3,833 lbs.		3,736 lb.		3,950 lb.	
Average yield of Scutched Flax per statute acre		44 st. 9 lb.		41 st. 9 lb.		45 st. 13 lb.	
Percentage of Scutched Flax from Retted Straw		16·30		15·60		16·28	
Average value of Scutched Flax per Stone*		6s. 10d.		6s. 7d.		6s. 11d.	
Average returns from Scutched Flax per statute acre		£15 4s. 9d.		£13 14s. 4d.		£15 17s. 10d.	
Average returns from Tows per statute acre		9s. 3d.		15s. 9d.		14s. 3d.	
Average returns from Flax and Tows per statute acre		£15 14s. 0d.		£14 10s. 1d.		£16 12s. 1d.	

* The Flax grown on each plot at each centre was valued separately.

Trials of Different Varieties of Russian, Dutch, and Irish Flax Seed (1913).

4		5		6		7		8		9		10	
Russian Kostroma.		Russian Pernau Crown (new) 1912 growth.		Russian Pernau Crown (old) 1911 growth.		Dutch Riga Child.		Irish Saved, 3rd Years Selection.		Irish Saved, 2nd Years Selection.		Irish Saved Unselected.	
Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.	Retted Straw lb.	Scutched Flax lb.
3,560	560	4,220	700	4,270	710	4,090	620	3,480	485	3,360	480	3,680	630
4,340	680	4,200	640	4,080	690	4,290	670	3,140	360	3,480	460	3,390	450
3,570	700	3,560	730	3,240	660	3,760	730	3,240	600	3,110	590	3,260	630
3,823 lb.		3,993 lb.		3,863 lb.		4,047 lb.		3,287 lb.		3,317 lb.		3,443 lb.	
46 st. 3lb.		49 st. 4 lb.		49 st. 1 lb.		48 st. 1 lb.		34 st. 6 lb.		36 st. 6 lb.		40 st. 10 lb.	
16·92		17·28		17·78		16·62		14·66		15·37		16·55	
6s. 10d. £15 15s. 10d.		7s. 0d. £17 5s. 0d.		7s. 2d. £17 11s. 4d.		6s. 11d. £16 12s. 8d.		6s. 10d. £11 16s. 7d.		6s. 8d. £12 3s. 4d.		6s. 8d. £13 13s. 2d.	
12s. 8d. £16 8s. 6d.		10s. 10d. £17 15s. 10d.		10s. 8d. £18 2s. 0d.		13s. 6d. £17 6s. 2d.		11s. 5d. £12 8s. 0d.		11s. 7d. £12 14s. 11d.		12s. 7d. £14 5s. 9d.	

These figures represent the average of the valuations.

THIRD IRISH EGG-LAYING COMPETITION.

SECOND QUARTERLY REPORT.

•1st January—31st March.

The second period of thirteen weeks of the Third Irish Laying Competition ended on 31st March, 1915.

As stated in the first quarterly report, many of the pens excelled in quality and type those sent in for previous competitions, and the figures in the table show that, notwithstanding one of the wettest winters on record, their laying has been exceptionally good.

Some Results.

In the Wyandotte section, pullet No. 129 (Pen 22) still continues her fine performance. From the date on which she began to lay (9th October) to the present date (31st March) she has laid 163 eggs. Pen 16 has advanced from 26th place at the end of December to 9th place at the end of March, and had these pullets been in good condition on arrival they would now stand much higher. This pen made the unusually high score of 162 eggs for the month of January.

"Winter Egg" Prize.

The "winter egg" prize is won by Pen 13, thus again proving the value of well bred Orpingtons as winter layers. Pens 22 and 25 (White Wyandottes) were, however, very close competitors, and now stand higher, owing to broodiness in Pen 13.

[Table.

TABLE A.—COMPETING PENS.

Order of Merit.	No. of Pen.	Breed.	No. of Eggs Laid.	Value of Eggs. £	s.	d.
1	22	White Wyandotte	646	4	7	6
2	25	White Wyandotte	616	4	7	5
3	21	White Wyandotte	615	4	4	7
4	13	Buff Orpington	593	4	2	3
	23	White Wyandotte	614	4	2	3
6	15	White Wyandotte	551	3	16	1
7	5	White Leghorn	525	3	11	6
8	4	White Leghorn	524	3	7	8
9	16	White Wyandotte	553	3	6	11½
10	31	Rhode Island Red	514	3	6	6
11	19	White Wyandotte	523	3	6	1
12	10	Red Sussex	512	3	6	0½
13	24	White Wyandotte	480	3	5	11
14	28	Rhode Island Red	474	3	4	4
15	20	White Wyandotte	510	3	3	6½
16	1	Black Minorca	443	3	1	4
17	33	Rhode Island Red	436	3	0	8½
18	18	White Wyandotte	465	3	0	1
19	27	White Wyandotte	448	3	0	0
20	11	Buff Orpington	430	2	19	6½
21	14	Buff Orpington	438	2	18	8
22	2	Black Minorca	410	2	15	7½
23	34	Rhode Island Red	404	2	15	5
	36	Rhode Island Red	407	2	15	5
25	6	White Leghorn	397	2	14	5½
26	32	Rhode Island Red	401	2	13	0½
27	8	Brown Leghorn	381	2	9	8½
28	35	Rhode Island Red	361	2	8	11
29	12	Buff Orpington	363	2	8	4
30	29	Rhode Island Red	374	2	7	7
31	30	Rhode Island Red	363	2	7	2
32	17	White Wyandotte	314	2	1	11½
33	9	Brown Leghorn	321	1	19	3

TABLE B.—NON-COMPETING PENS.

Order of Merit.	No. of Pen.	Breed.	No. of Eggs Laid.	£	s.	d.
1	26	White Wyandotte	617	4	9	0½
2	39	Rhode Island Red	568	3	18	11½
3	38	Rhode Island Red	490	3	4	9½
4	43	Rhode Island Red	482	3	4	8½
5	44	White Wyandotte	494	3	4	8
6	41	Rhode Island Red	461	3	2	4
7	40	Rhode Island Red	448	3	0	5½
8	37	Rhode Island Red	449	2	19	2½
9	42	Rhode Island Red	379	2	8	8½
10	3	Black Minorca	343	2	6	8½
11	7	White Leghorn	336	2	3	7

TABLE C.—SECOND YEAR HENS.

Order of Merit.	No. of Pen.	Breed.	No. of Eggs Laid.	£	s.	d.
1	45	Rhode Island Red	350	2	6	10
2	47	Rhode Island Red	366	2	6	6
3	50	Rhode Island Red	341	2	3	9½
4	46	Rhode Island Red	132	0	15	9

TABLE D.—THIRD YEAR HENS.

Order of Merit.	No. of Pen.	Breed.	No. of Eggs Laid.	£	s.	d.
1	49	Rhode Island Red	218	1	8	3
2	48	Rhode Island Red	100	0	12	10½

L. MURPHY.

AN EXPERIMENT IN FARRIERY INSTRUCTION IN IRELAND.

Early in 1913 the Department engaged the services of Mr. Frank Watson, A.F.C.L., an experienced Master Farrier from London, and formerly Instructor under the London County Council. Classes were opened in the North Riding of County Tipperary, and afterwards in Tipperary Town, and in County Waterford. A second Instructor, Mr. E. G. Norton, A.F.C.L., was engaged at a later date, to open classes in Coleraine and elsewhere in the North of Ireland.

Scope and Object of the Experiment.

The object in view was to improve the practice of Horse-shoeing by giving detailed instruction regarding the structure and functions of the horse's foot, and by teaching the best methods of making shoes for normal and abnormal feet. It had long been felt that instruction in the principles and practices of farriery was much required in Ireland, because in many districts shoeing work was not only extremely crude, but was performed on wrong principles. The large number of horses going lame owing to unsuitable shoeing pointed to the necessity for instruction on proper lines.

In view of the nature of this industry, and the fact that its workers are scattered over a wide area, it was necessary to resort to an "itinerant" system of instruction.

A forge was selected in each centre of instruction, and where only one fire was available the Department sent a travelling forge, to enable a larger number of students to be taught. Prior to the opening of a class the Instructor visited the district and called on the farriers at forges within a radius of six or more miles of the selected forge and explained the nature of the Instruction to be given and the advantages to be derived from attendance at the Class. Instruction was provided free of all charge. Each class, usually held from 7 to 9 p.m., was attended by twelve or more blacksmiths, and those from a distance cycled to and from the Class.

Work of the Course.

The Course of Instruction given was fairly exhaustive, and comprised the following syllabus :—The history and principles of shoeing ; the hoof and foot ; dissection of foot ; structure and functions of the wall, sole, frog and bars ; use and abuse of the frog ; care of the feet ; physiology of the foot ; evils of cutting and rasping ; toe and heel shoeing ; blood circulation of the foot ; frog pressure and

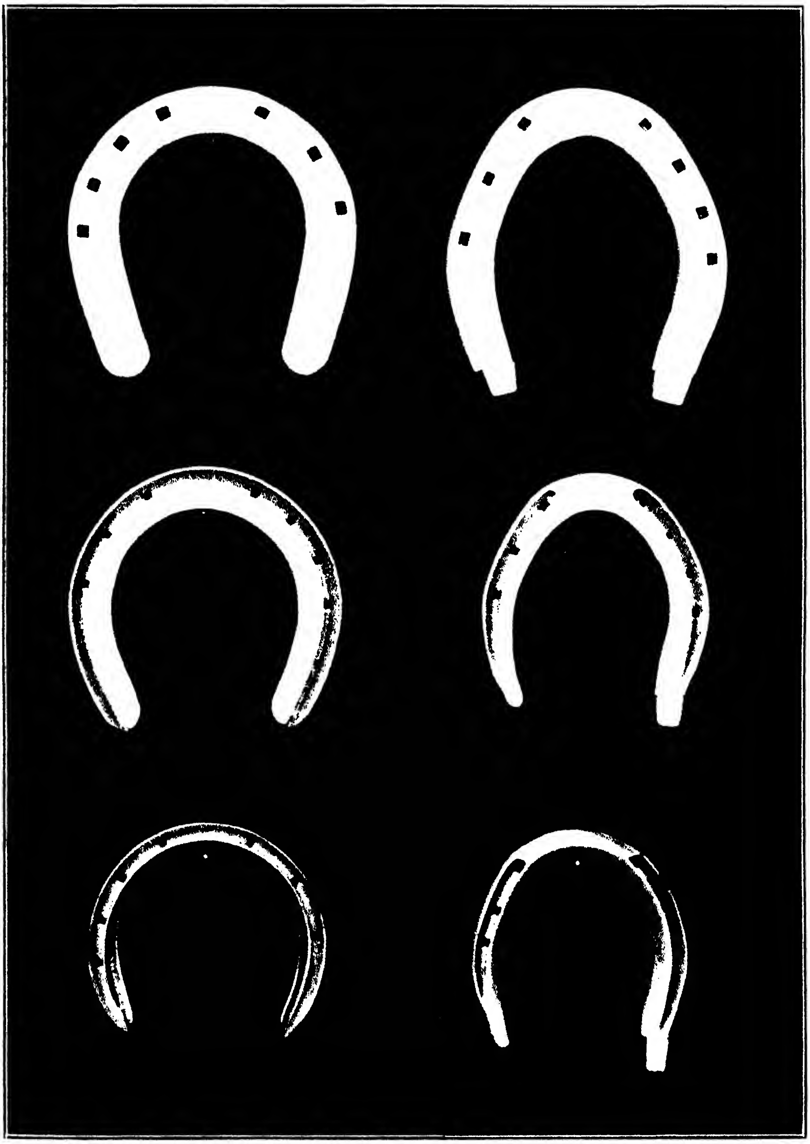


Fig. 1. Cart-horse fore and hind shoes (stamped).
Roadster fore and hind shoes (hand fullered).
Hunter fore and hind shoes (tooled and hand fullered.)

AN EXPERIMENT IN FARRIERY INSTRUCTION IN IRELAND.

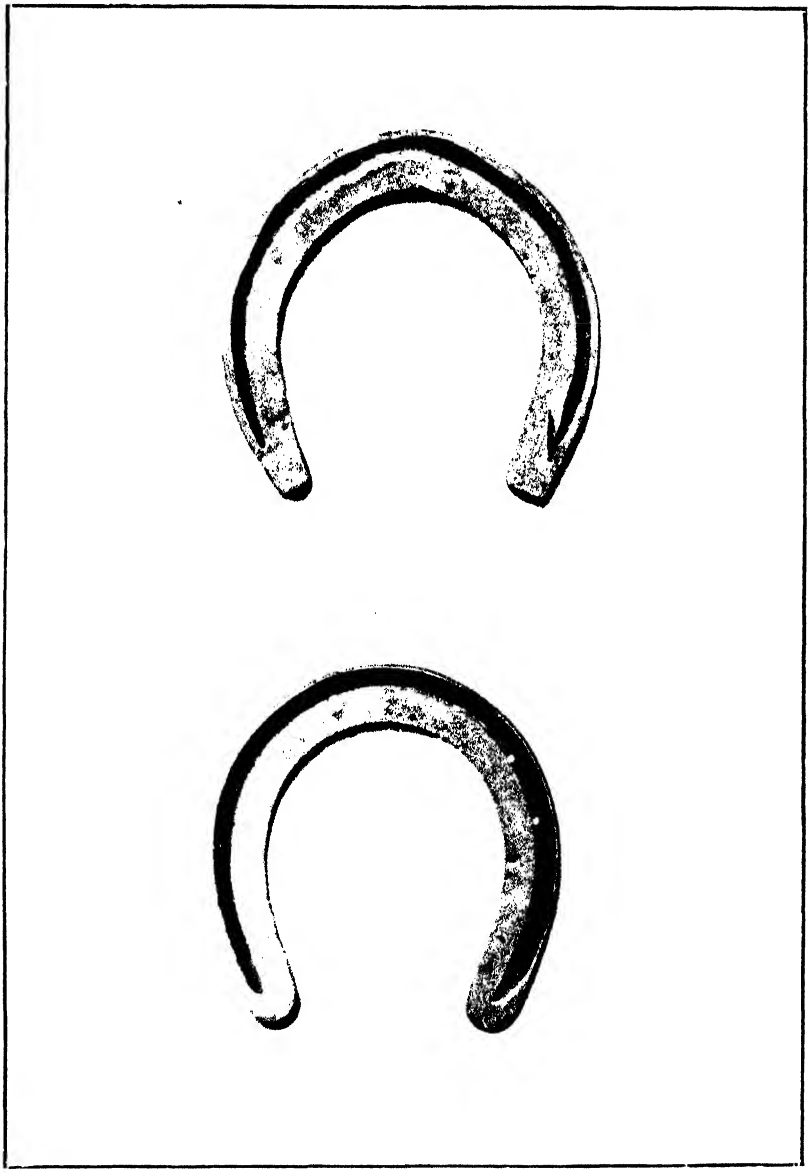


Fig. 2. Roadster foreshoe made by student at beginning of course, and shoe made by same student at end of course.

blood supply ; positions of bones, joints, etc. ; ligaments and articulations ; action of lateral cartilage ; prick and nail bind of foot ; leathers and pads ; hand-made and machine-made shoes ; shoeing for corns and thrush ; laminitis and dropped soles ; other diseases of the foot ; pathological shoeing ; calkins, wedge and thin-heel shoes ; special shoes ; Charlier tips, bars, rockers, etc.

Practical Work.

Practical demonstrations at the forge in the making of the different classes of shoes were given by the instructor, and the students in rotation were required to make a certain number of shoes of different types, under the supervision of the instructor. The proper preparation of the feet and the fitting and fixing of shoes were also taught.

The first aim of the Instructor was to impart the necessary knowledge of the anatomy of the horse's foot, because the commoner mistakes made by shoeing smiths, whereby horses suffer much discomfort and pain, are due to ignorance of the structure and functions of the various parts of the foot.

The students were taught the correct methods of forging and making shoes, and after mastering the simpler types of shoes they were taught shoeing to remedy or alleviate defects, lameness, injuries, etc.

Shoeing : Good and Bad.

Horse-shoeing is an artificial process, designed simply to enable the animal to draw and carry loads, and it is important that the structures of the foot should be interfered with as little as possible. The preparation of the foot to receive the shoe is highly important, and the students were taught that to cut the frog, as is unfortunately too commonly done by smiths, is to deprive the foot of its natural pad. After being cut—mutilated—the frog does not come into contact with the ground, the circulation of blood through the foot is restricted, and, consequently various evils, such as excessive concussion, contraction and extension of the limb, are produced.

The horny sole should not be pared, as it protects the sensitive sole from being injured by hard substances with which the horny sole comes in contact. The horny sole, in its natural state, exfoliates in flakes, but any flakes, which have been prevented by the shoe from being detached, may be removed.

The "wall" would in the natural state of the foot be worn away by the friction from contact with the ground. The wearing of a shoe prevents this, and therefore with each shoeing the wall requires to be reduced. This is often improperly and carelessly done. In performing this operation successfully the farrier should be guided by

his knowledge of the relation of the wall to the sole, and when the white line or pyth is reached the wall has been sufficiently reduced. Great care is necessary to obtain a level bearing, which means comfort to the horse in travelling. The hoof, if properly prepared, has nothing to be rasped off after the shoe is nailed on. The overgrowth should be taken off before the shoe is fitted to the foot.

When the farrier is making shoes he should bear in mind whether he is preparing fore or hind shoes, left or right, as all feet differ in shape. Shoes for abnormal feet are most suitably made when the horse is at the forge, as it is difficult to alter shoes when once they are made. The iron should be chosen to suit the size of the foot, because shoes which are too heavy cause strain and are detrimental to the well-being of the foot and limb. Shoes which are hand-fullered require to be made of good material, so that the fuller mark may be made deep enough to accommodate the countersink of the head of the nail. When the counter-sink of the nail head is not properly accommodated the shoes very soon become loose and separate from the wall, while the clinches rise and cause the horse to cut the opposite leg. Stamped shoes are best for heavy draft horses, since they are more easily made and the nail-heads are supported on all four sides. Under ordinary conditions only hind shoes should have calkins.

Visits to local Forges.

In addition to the instruction given in the evening classes, the Instructor visited in rotation the forges of his students during the daytime, when useful information was imparted to the smiths, more especially with regard to the shoeing of lame horses and others that presented abnormalities of different kinds.* The most common cases that were dealt with were horses suffering from laminitis, sandcracks, navicular disease and contraction. As the Instructor's visits were known beforehand, each smith took care to have ready at his forge the local horses that he had found difficult to provide with suitable shoes.

Shoeing Defective Horses.

The above mentioned abnormal conditions were made the themes for special lessons and in many cases the lameness was alleviated, and often cured altogether. Horses suffering from laminitis can be shod so that they can travel quite soundly. The pupils were shown that in cases of sandcrack, with proper shoeing and attention, the hoof can be trained to grow down in a healthy manner, that horses with incurved heels can be shod in such a way as to bring the feet gradually to a normal condition and while navicular disease is incurable, horses can be shod so that

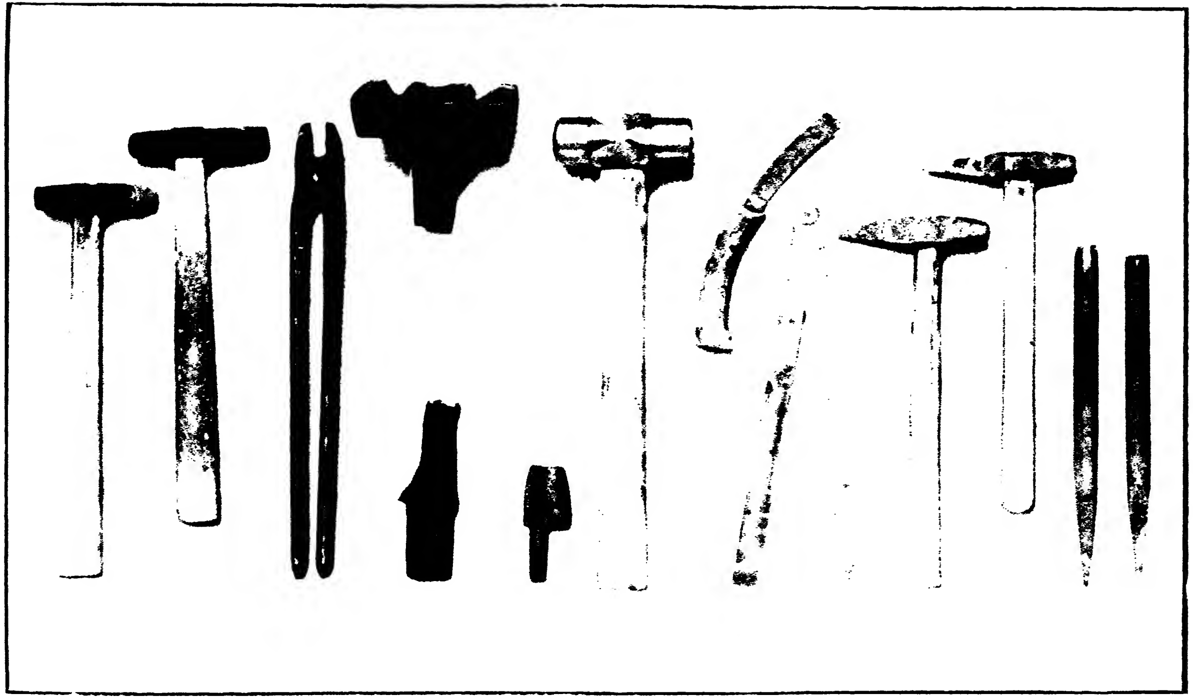


Fig. 3. Fireman's tools : Two fullers, pair of tongs, hunter's concave tool (*top*), two heel cutters (*bottom*), shoe turning hammer, drawing-knife, rule, two stamps, two pritchels.

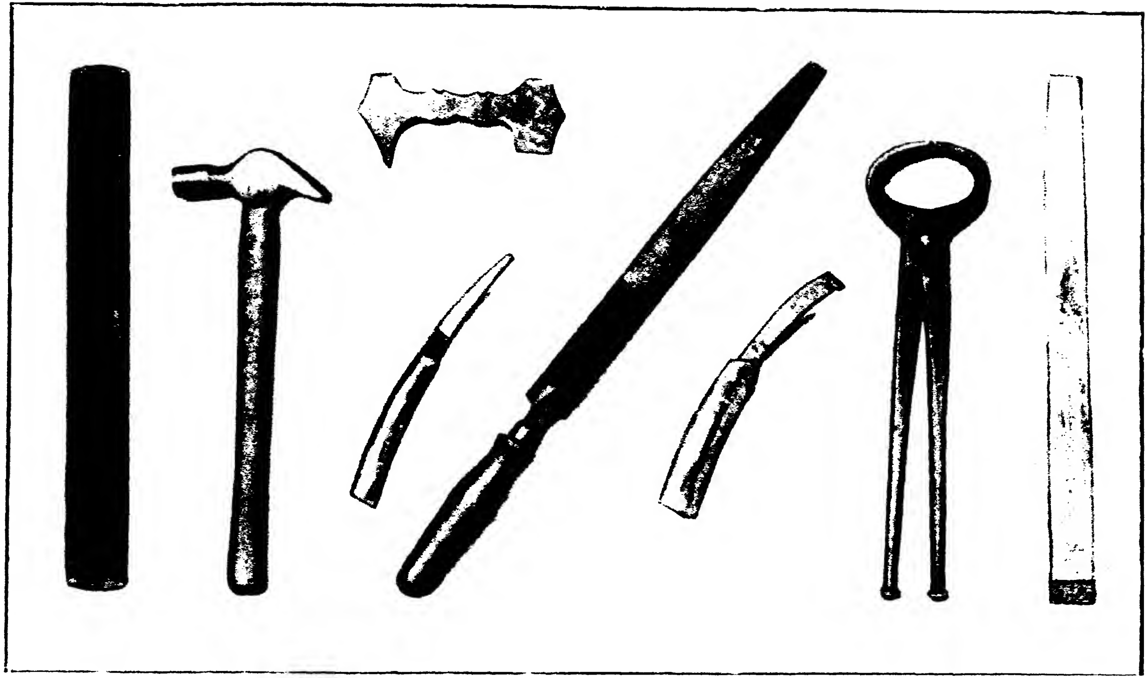


Fig. 4.—Doorman's tools: Rasp, hammer, buffer, searcher, file, drawing-knife, pincers, toeing-knife.

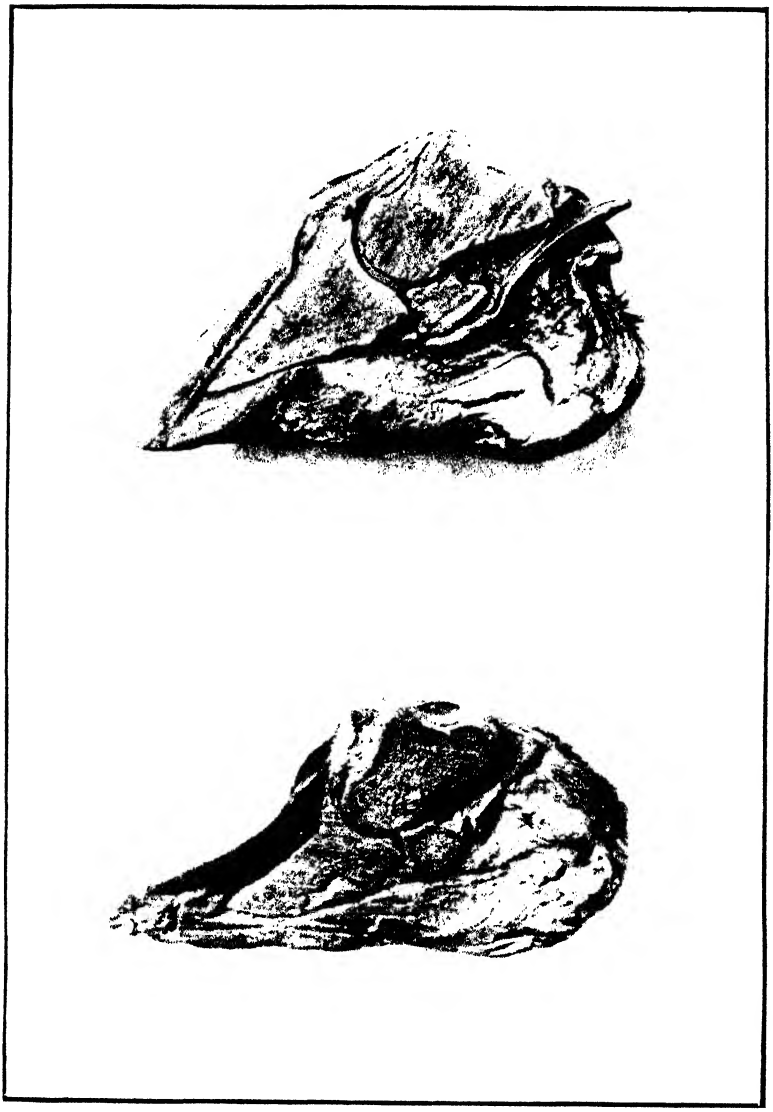


Fig. 5. Section of normal foot (*top*), and (*bottom*) section of foot showing the position of the bones after severe *laminitis*.

AN EXPERIMENT IN FARRIERY INSTRUCTION IN IRELAND.

Fig. 6.—Shoeing a lame horse at forge.

they can travel comfortably and last many years longer than they would with ordinary shoes.

Experience shows that where smiths have received no special training or instruction on sound lines there are a great many more cases of brushing, forging, over-reaching, contraction, etc., than where they have been properly taught how to avoid those evils. Several of the diseases mentioned in the preceding paragraph, and such others as sidebone, corns, etc., are caused, mainly by bad shoeing in the first instance, and in the hands of smiths who have not received adequate expert training these cases become aggravated until the horses in question are condemned as useless and destroyed.

Success of the Experiment.

All doubt as to whether the classes in Farriery would be a success in Ireland is now at an end. Wherever the Instructors have conducted courses the keenest interest has been aroused, not only among the smiths, but among horse-owners also. The smiths who came as students in some cases cycled distances up to nine miles to attend the classes, while others have travelled long distances to ask advice of the Instructors regarding difficulties they have met with in their own practice. In confirmation of the benefit that has been derived from the instruction, it may be mentioned that many horse-owners—too numerous to name—have already given testimony to the benefit accruing from the improved methods of shoeing as practised by the Instructors and their students. The financial gain is already considerable, but the main points are the prevention of suffering, and the consequent prolongation of usefulness of the great majority of horses shod by smiths who have received adequate technical training.

The following is a list of the different shoes made by students at one of thes hort courses, but there were also other types which were made by the Instructors, or made by smiths under the supervision of the Instructors during the visits of the latter to individual forges during the daytime :—

1. Fullered flat front shoes.
2. Fullered plain hind shoes.
3. Fullered seated front shoes.
4. Fullered preventer hind shoes.
5. Fullered preventer front shoes.
6. Fullered seated ¾-bar shoes.
7. Fullered set shoes.
8. Stamped rocker shoes.
9. Stamped shoes for horse with sidebone.
10. Stamped cart-horse front shoes.

11. Stamped cart-horse hind shoes.
12. Fullered square toe hind shoes.
13. Fullered diamond toe hind shoes.
14. Fullered seated bar shoes.
15. Fullered ground seated front shoes.
16. Fullered frog pressure bar shoes.
17. Fullered G shoes.
18. Special fullered preventer front shoes.
19. Special fullered preventer hind shoes.
20. Fullered rocker bar shoes.

Shoeing Competition.

Agricultural societies in other countries have done much good in recent years by holding horse-shoeing competitions in connection with their annual Shows. Formerly it was considered a sufficient test of a farrier's skill if he made a set of shoes in his own forge, but neither time-limit nor supervision was required. The shoes were taken to the Show to be judged along with others made under similar conditions. This method has fortunately almost disappeared. Now the shoes are made on the Show ground under public observation, and a time-limit is assigned. The work is judged by a skilled practical farrier who awards marks for the methods adopted as the work proceeds and for the appearance of the finished article. This procedure saves much discussion at the close, and when unsuccessful farriers have their mistakes pointed out they are encouraged to compete at other Shows.

A Horse-shoeing competition was held at the Nenagh Show on 15th August, 1913, and this is believed to be the first of its kind in Ireland.

There was at the same time an exhibit of horseshoes made at the Class held in Nenagh during that year, and it showed the first and last shoes made by the respective students. This exhibit was greatly appreciated by the horse-owning public.

A horseshoe-making and horse-shoeing competition was held at Tipperary Show on the 28th and 29th July, 1914, and created much interest, especially among veterinary surgeons, horse-owners and farriers. At each competition the work of the prize-winners was of a very high standard. There were several entries by men who had not had the opportunity of attending the classes of instruction, but they were quite outclassed by the students, and some did not compete when they saw the excellent work which was done by the Class students.

Such competitions serve a useful purpose in showing horse-owners

Fig. 7.—Some students at the Dungarvan farriery class.

that by proper technical training a high standard of efficiency can be obtained, and in stimulating farriers to attain that high standard.

The following Statement gives an indication of the extent of the instruction given. The principles involved were practically demonstrated in actual forge work :—

	No. of lessons
Co. Tipperary, N.R.	
Thurles	21
Cormackstown	23
Nenagh	41
Tipperary U. District	69
**Co. Waterford*—*	
Dungarvan	32
Lismore	32
Co. Londonderry—	
Garvagh	12
Coleraine	24
Kilrea	12
Limavady	25
Dungiven	23
Maghera	20
Magherafelt	39
Draperstown	19

At present classes are being held at two centres in Co. Tipperary (S.R.) and at two centres in Co. Londonderry.

* In addition to these classes numerous Demonstrations were given in forges throughout the County.

WINTER EGG RECORDS, 1914-15.

In the issue of the JOURNAL, Vol. IX., No. 4, an article appeared dealing with Winter Egg Records and giving a number of records for the period October, 1908—March, 1909. Further articles in the JOURNAL, Vol. X., No. 3, Vol. XI., No. 3, Vol. XII., No. 3, Vol. XIII., No. 3, and Vol. XIV., No. 3, set forth the results for the six monthly periods October, 1909—March, 1910, October, 1910—March, 1911, October, 1911—March, 1912, October, 1912,—March, 1913, and October, 1913, to March, 1914, respectively. Some records for last winter—October, 1914-March, 1915—are given in the accompanying Tables. The results for the seven winter seasons are shown in the following Table :—

Name of Breed.	Oct., 1908 to March, 1909.	Oct., 1909 to March, 1910.	Oct., 1910 to March, 1911.	Oct., 1911 to March, 1912.	Oct., 1912 to March, 1913.	Oct., 1913 to March, 1914.	Oct., 1914, to March, 1915.
White Leghorns	44·3	39·7	41·5	45·1	42·4	47·4	49·5
Brown Leghorns	40·7	42·1	37·9	49·3	51·8	38·1	—
Black Leghorns	—	—	—	—	64·3	—	—
Minorcas	32·8	38·0	48·3	48·3	86·3	60·5	45.9
Buff Orpingtons	54·5	42·4	45·2	42·6	49·1	58·6	42·8
White Orpingtons	50·7	48·7	54·1	52·6	44·1	38·6	35·4
White Wyandottes	56·6	34·2	45·2	45·8	42·9	33·9	35·8
Faverolles	42·5	41·5	35·7	28·8	42·2	34·9	28·7
Plymouth Rocks	35·9	39·2	45·5	36·5	43·1	38·8	32·9
Anconas	—	—	—	64·9	—	—	—
Houdans	59·2	58·5	62·5	58·0	75·8	46·4	51·8
Andalusians	—	71·3	—	—	—	—	—
Rhode Island Reds	—	—	63·9	61·9	49·1	48·4	45·9
Light Sussex	31·6	32·1	39·8	41·8	38·4	49·7	33·6
Red Sussex					—	32·5	28·5
Mixed Pure Breeds	39·7	—	—	—	—	—	—
Mixed Breeds	40·8	41·9	40·5	41·6	43·7	42·4	41·9
General Averages	42·3	40·7	42·7	41·8	44·2	42·2	40·5

Omitting the breeds of which the returns relate to less than 100 birds, we have the following figures :—

White Leghorns	49·5
White Wyandottes	35·8
Faverolles	28·7
Plymouth Rocks	32·9
Rhode Island Reds	45·9
Light Sussex	33·6
Mixed Breeds	41.9

It will be seen that White Leghorns and Rhode Island Reds show the best results.

Importance of Strain. The great variations in results due to strain which have been continually pointed out in the articles relating to Egg Records, still show themselves as markedly as ever, as will be seen from the following Table :—

Name of Breed.	Average of all the flocks.	Average of best flock.	Average of worst flock.
White Leghorns, . . .	49·5	83 7	30·7
White Wyandottes, . .	35·8	45·8	31·7
Faverolles, ...	28·7	37·6	19·9
Plymouth Rocks, . .	32·9	55·2	15·5
Rhode Island Reds, . .	45·9	64 9	22·3
Light Sussex, . . .	33·6	54·6	22·3
Mixed Breeds, . . .	41·9	73·7	12·7

The importance of strain is thus again brought out.

EGG RECORDS.—WINTER, 1914-5.

SUMMARY TABLE.

Name of Breed.	October.		November.		December.		January.		February.		March.		Total of Monthly Averages.
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
White Leghorns .	182	4·8	193	4·1	263	4·9	230	8·2	232	8·0	250	19·5	49·5
Minorcas, .	55	7·5	86	4·1	88	2·3	87	5·2	98	8·6	86	18·2	45·9
Buff Orpingtons, .	30	7·4	62	3·3	63	6·9	70	6·4	69	6·6	65	12·2	42·8
White Orpingtons, .	53	4·0	96	1·4	98	2·5	99	5·9	93	8·0	88	13·6	35·4
White Wyandottes, .	108	3·9	149	2·0	173	2·5	172	5·0	175	7·5	144	14·9	35·8
Faverolles, .	181	2·6	218	1·0	205	1·7	169	4·1	167	5·7	164	13·6	28·7
Plymouth Rocks, .	286	5·0	401	1·6	442	2·2	451	4·2	427	6·9	419	13·0	32·9
Houdans, .	16	8·5	14	5·2	14	4·8	13	6·8	12	10·7	12	15·8	51·8
Rhode Island Reds, .	165	6·3	209	4·1	223	5·0	328	6·3	339	8·7	345	15·5	45·9
Light Sussex, .	93	4·0	107	1·5	107	3·1	107	4·9	107	7·7	102	12·4	33·6
Red Sussex, .	43	4·3	43	3·1	42	0·4	42	2·7	42	6·5	41	11·5	28·5
Mixed Breeds, .	1,802	5·6	2,116	3·5	2,214	3·9	2,416	6·0	2,289	8·0	2,238	14·9	41·9
Totals, .	3,014	5·3	3,694	3·1	3,932	3·6	4,184	5·8	4,050	7·8	3,954	14·9	40·5

WHITE LEGHORNS.

Number.	October.		November.		December.		January.		February		March.		Total of Monthly Averages.
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
1	21	2·0	27	3·0	27	7·6	25	11·0	25	9·1	27	21·2	53·9
2	31	0·7	33	0·9	38	0·6	—	—	—	—	—	—	—
3	35	7·9	35	8·1	48	5·1	54	4·8	55	5·6	54	15·2	46·7
4	20	13·2	20	12·6	35	9·4	35	12·2	40	11·9	40	24·4	83·7
5	24	2·5	35	2·7	35	2·7	33	8·3	33	9·7	33	18·1	44·0
6	18	3·8	18	0·0	37	0·6	40	2·7	40	4·2	40	19·4	30·7
7	9	3·9	—	—	18	10·6	18	9·2	14	15·2	31	16·4	—
8	24	4·4	25	2·1	25	6·8	25	15·1	25	14·9	25	25·5	68·8
Totals,	182	4·8	193	4·1	263	4·9	230	8·2	232	8·0	250	19·5	49·5

MINORCAS.

1	30	4·7	44	0·0	46	0·6	45	3·1	45	4·7	35	16·1	29·2
2	25	10·8	42	8·4	2	4·1	42	7·6	42	12·5	42	19·5	62·9
3	—	—	—	—	—	—	—	—	11	9·3	9	20·3	—
Totals,	55	7·5	86	4·1	88	2·3	87	5·2	98	8·6	86	18·2	45·9

BUFF ORPINGTONS.

1	10	1·3	20	1·3	23	5·5	30	3·4	30	4·1	27	11·1	26·7
2	20	9·5	42	4·2	40	7·6	40	8·6	39	8·6	38	12·9	51·4
Totals,	30	7·4	62	3·3	63	6·9	70	6·4	69	6·6	65	12·2	42·8

WHITE ORPINGTONS.

1	23	3·4	33	2·1	33	5·0	31	5·9	28	9·4	23	18·1	43·9
2	15	1·0	30	0·4	30	0·4	33	0·5	30	2·9	30	8·6	13·8
3	15	8·0	33	1·5	35	2·0	35	11·1	35	11·4	35	15·0	49·0
Totals,	53	4·0	96	1·4	98	2·5	99	5·9	93	8·0	88	13·6	35·4

WHITE WYANDOTTES.

Number.	October.		November.		December.		January.		February.		March.		Total of Monthly Averages.
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen	
1	20	8·2	34	0·9	34	0·4	34	2·1	34	5·4	36	14·7	31·7
2	31	3·5	28	5·5	32	6·1	32	7·7	32	8·4	34	14·6	45·8
3	28	3·3	26	3·0	44	3·3	41	5·7	44	13·0	44	15·3	43·6
4	29	2·0	28	1·1	30	2·8	32	9·0	32	9·3	30	14·6	38·8
5	—	—	33	0·1	33	0·0	33	0·4	33	3·3	—	—	—
Totals,	108	3·9	149	2·0	173	2·5	172	5·0	175	7·5	144	14·9	35·8

FAVEROLLES.

1	22	0·0	30	0·7	30	3·4	30	3·4	30	3·6	30	14·3	25·4
2	13	2·6	18	0·0	22	0·0	18	1·8	17	1·8	14	13·7	19·9
3	13	6·9	24	2·4	24	3·8	23	4·8	23	7·4	23	12·1	37·4
4	40	1·1	40	0·0	33	1·0	40	2·9	40	6·6	40	14·6	26·2
5	35	2·1	30	0·9	30	0·5	30	4·6	30	6·3	30	11·2	25·6
6	9	16·2	9	0·0	—	—	—	—	—	—	—	—	—
7	34	0·8	36	0·8	37	2·1	—	—	—		—	—	—
8	15	3·8	31	2·9	29	1·4	28	7·0	27	7·1	27	15·4	37·6
Totals,	181	2·6	218	1·0	205	1·7	169	4·1	167	5·7	164	13·6	28·7

PLYMOUTH ROCKS.

1	36	1·1	33	0·3	33	0·4	31	2·0	32	8·3	30	12·0	24·1
2	9	3·6	15	0·0	14	2·0	13	4·2	12	8·4	12	15·0	33·2
3	25	6·1	27	2·2	27	3·7	27	6·5	25	9·9	26	18·5	46·9
4	24	5·7	40	1·0	40	3·1	40	6·2	39	8·0	39	12·3	36·3
5	22	7·3	22	5·3	33	2·9	33	2·7	23	7·8	23	15·3	41·3
6	15	10·1	32	0·3	32	0·0	32	0·0	32	0·5	32	4·6	15·5
7	30	4·1	44	2·9	44	2·5	42	3·5	42	5·5	41	12·7	31·2
8	13	1·0	33	0·1	33	2·8	33	2·8	33	3·1	33	9·2	19·0
9	19	8·7	19	4·4	34	5·9	34	10·2	34	10·7	34	15·3	55·2
10	9	2·1	30	0·2	33	0·9	48	3·1	38	5·4	33	8·2	19·9
11	61	2·7	70	0·5	84	1·0	84	4·5	84	7·6	84	17·0	33·3
12	23	12·2	36	4·5	35	2·2	34	4·7	33	8·0	32	12·3	43·9
Totals,	286	5·0	401	1·6	442	2·2	451	4·2	427	6·9	419	13·0	32·9

HOUDANS.

Number.	October. Number of Hens.	October. Average Number of Eggs laid per Hen.	November. Number of Hens.	November. Average Number of Eggs laid per Hen.	December. Number of Hens.	December. Average Number of Eggs laid per Hen.	January. Number of Hens.	January. Average Number of Eggs laid per Hen.	February. Number of Hens.	February. Average Number of Eggs laid per Hen.	March. Number of Hens.	March. Average Number of Eggs laid per Hen.	Total of Monthly Averages.
1	16	8·5	14	5·2	14	4·8	13	6·8	12	10·7	12	15·8	51·8

RHODE ISLAND REDS.

1	33	1·0	33	2·7	33	7·3	33	8·1	33	10·8	32	18·7	48·6
2	17	7·3	32	5·3	32	3·5	29	5·4	32	12·2	32	16·2	49·9
3	16	10·1	24	6·6	24	7·1	26	11·4	25	11·9	25	17·4	64·5
4	28	12·8	42	4·4	52	6·2	42	11·7	40	12·6	40	17·2	64·9
5	20	9·7	20	3·5	26	1·7	29	3·0	29	4·3	29	11·7	33·9
6	15	2·2	22	0·5	22	0·0	21	3·9	21	7·9	20	12·6	27·1
7	—	—	—	—	—	—	39	8·4	21	12·4	30	14·3	—
8	6	0·0	6	0·0	4	0·0	8	3·0	7	3·9	7	15·4	22·3
9	30	4·3	30	6·1	39	7·6	30	7·5	30	8·7	30	17·3	51·5
10	—	—	—	—	—	—	80	2·4	80	4·0	80	11·6	—
11	—	—	—	—	—	—	—	—	21	11·2	20	25·7	—
Totals,	165	6·3	209	4·1	223	5·0	328	6·3	339	8·7	345	15·5	45·9

LIGHT SUSSEX.

1	15	4·0	15	1·1	15	6·8	15	8·8	15	13·1	12	15·0	48·8
2	16	2·3	30	1·0	30	2·4	30	2.6	30	5·3	30	11·9	25·5
3	22	7·7	22	5·2	22	5·7	22	10·8	22	12·0	20	13·2	54·6
4	40	2·7	40	0·0	40	0·9	40	2·0	40	5·2	40	11·5	22·3
Totals,	93	4·0	107	1·5	107	3·1	107	4·9	107	7·7	102	12·4	33·6

RED SUSSEX.

1	43	4·3	43	3·1	42	0·4	42	2·7	42	6·5	41	11·5	28·5

MIXED BREEDS.

Number.	October: Number of Hens.	October: Average Number of Eggs laid per Hen.	November: Number of Hens.	November: Average Number of Eggs laid per Hen.	December: Number of Hens.	December: Average Number of Eggs laid per Hen.	January: Number of Hens.	January: Average Number of Eggs laid per Hen.	February: Number of Hens.	February: Average Number of Eggs laid per Hen.	March: Number of Hens.	March: Average Number of Eggs laid per Hen.	Total of Monthly Averages.
1	20	6·4	50	3·3	90	1·8	90	3·3	70	5·0	70	12 2	32.0
2	50	3·7	70	1·2	62	2·6	55	6·7	55	7·1	54	13·7	35·0
3	39	0·4	46	5·6	43	7·7	49	6·9	47	9·1	40	23·3	53·0
4	22	2·0	18	1·5	18	0·4	32	2·0	30	2 3	30	11·4	19·6
5	34	7·0	46	5·0	45	5·2	40	7·2	40	7·1	40	18·6	5 ·1
6	30	5·5	60	2·1	55	1·9	60	5·7	60	7·7	60	13·3	36·2
7	60	7·2	64	3·3	64	2·9	59	6·8	58	11·4	57	18·3	49·9
8	70	2·3	70	3·6	122	2·7	122	2·9	—	—	—	—	—
9	24	8·8	39	2·0	35	2·3	35	0·0	38	2·9	45	10·4	26·4
10	54	10·0	58	2·6	60	2·1	60	5·1	60	9·0	60	18·5	47·3
11	38	7·4	49	4·4	49	5·7	46	9·3	47	6·5	47	18·0	51·3
12	40	2·2	40	5·7	53	7·7	52	9·4	50	6·7	56	13·6	45·3
13	49	3·7	47	0·6	47	0·8	42	1·1	47	2·6	47	6 0	14·8
14	50	6·9	50	4·2	50	1·2	50	3·7	61	8·0	60	18·5	42·5
15	39	9·4	63	3·1	53	1·6	43	4·4	43	6·8	42	13·5	38·8
16	47	3·9	49	0·1	51	0·9	70	0·9	70	3·8	70	9·4	19·0
17	35	3·1	66	1·0	69	0·3	72	1·4	73	4·7	73	13·4	23·9
18	29	7·4	29	4·1	28	3·5	31	7·0	35	9·8	36	15·4	47·2
19	70	8·6	70	8·4	75	6·4	75	5·8	75	8·8	75	14·7	52·7
20	30	8·3	30	0·4	30	0·6	31	3·3	32	6·3	40	4·7	23·6
21	18	6·6	29	4·5	23	5·7	23	6·7	24	10·6	24	20·7	54·8
22	9	2·2	20	0·9	20	3·9	31	3·1	31	4·2	30	12·1	26·4
23	24	5·6	24	2·7	24	3·0	24	5·5	24	9·0	25	20·4	46·2
24	28	4·5	26	2·8	29	3·6	29	5·4	30	6·0	28	11·5	33·8
25	73	5·7	80	2·7	93	3· 4	93	6·2	85	8·3	80	16·0	42·3
26	75	1·3	95	0·7	90	2·2	91	4·6	85	6·2	85	14·9	29·9
27	23	6·0	29	0·9	36	1·1	34	4·2	31	4·3	—	—	—
28	50	5·2	50	2·8	50	7·1	60	6·7	50	11·2	50	13·4	46·4
29	35	3·0	34	3·1	37	4·6	38	4·7	38	7·1	37	13·8	36·3
30	50	4·8	50	3·6	60	4·6	70	7·9	60	13·4	50	19·9	54·2
31	35	9 7	34	8·8	32	7·0	33	10·8	36	11·2	33	23·9	71 4
32	81	5·3	82	3·0	86	3·6	101	4·9	106	6·4	111	13·9	37·1
33	14	3·2	14	2·5	13	7·0	13	7·3	13	2·8	6	6·5	29·3
34	49	5·7	90	2·1	76	4·1	75	7·9	89	8·1	85	14·6	42·5
35	41	9·4	39	7·5	38	8·6	40	12·8	37	14·8	34	20·6	73·7
36	14	0·6	34	0·0	34	0·0	39	0·0	28	3·6	40	8·5	12·7
37	50	4·8	50	4·4	50	5·4	55	9·8	55	11·9	59	15·3	51·6
38	28	4·3	31	3·9	34	4·8	39	3·2	33	6·7	34	12·7	35·6
39	20	3·7	25	1·7	20	2·0	20	3·4	20	4·2	20	10·7	25·7
40	27	2·3	36	1·7	36	3·0	36	1·6	36	3·3	36	13·8	25·7
41	90	6·4	90	6·9	90	6·5	90	9·4	90	12·7	90	20·9	62·8
42	15	4·9	16	1·8	28	2·0	25	8·6	25	7·2	24	14·4	38·9
43	60	13·1	50	11.8	40	9·5	46	12·8	60	9·6	45	10·6	67·4
44	13	6·0	24	5·9	26	11·5	26	8·2	25	11·0	24	17·2	59·8
45	50	5·6	50	1·9	50	9 6	50	9·5	62	9·9	61	12·1	48·6
46	—	—	—	—	—	—	130	11·3	125	11·8	125	17·9	—
Totals,	1,802	5·6	2,116	3·5	2,214	3·9	2,416	6·0	2,289	8·0	2,238	14·9	41·9

OFFICIAL DOCUMENTS.

I.—AGRICULTURE.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

NEW SCHEME OF FIELD MANURIAL EXPERIMENTS.

Experiments I. to V. inclusive are to be conducted on peat soils only. In each case a sample of the soil is to be taken before the plots are laid down and submitted for analysis to permit of the percentage of lime and organic matter being determined

Experiment VI. is to be carried out in all seaboard counties where seaweed is generally used. In order that tests of this kind may provide information as precise and comprehensive as possible, Instructors are required to submit to the Department small but representative samples of the seaweed applied. The samples should reach the Department in such condition as will render it possible to identify the species of the seaweed.

I.—OATS.

Size of Plot: One-tenth Statute Acre.

The following kinds and quantities of manures will be used per statute acre :—

No. of Plot.	
1	No Manure.
2	3 cwt. Superphosphate.
3	3 cwt. Superphosphate. 2 cwt. Kainit.
4	1 cwt. Sulphate of Ammonia. 3 cwt. Superphosphate. 2 cwt. Kainit.
5	1 cwt. Nitrate of Soda. 3 cwt. Superphosphate. 2 cwt. Kainit.

II.—TURNIPS.

Size of Plot: One-twentieth Statute Acre.

The following kinds and quantities of manures will be used per statute acre :—

No. of Plot	
1	15 tons Farmyard Manure.
2	15 tons Farmyard Manure. 4 cwt. Superphosphate.
3	15 tons Farmyard Manure. 4 cwt. Slag.

No. of Plot.	
4	15 tons Farmyard Manure. 4 cwt. Superphosphate. 2 cwt. Kainit.
5	15 tons Farmyard Manure. 4 cwt. Slag. 2 cwt. Kainit.
6	4 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 3 cwt. Kainit.
7	4 cwt. Slag. 1 cwt. Sulphate of Ammonia. 3 cwt. Kainit.

III.—MANGELS.

Size of Plot: One-twentieth Statute Acre.

The following kinds and quantities of manures will be used per statute acre :—

No. of Plot.	
1	20 tons Farmyard Manure.
2	20 tons Farmyard Manure. 4 cwt. Superphosphate. 4 cwt. Kainit.
3	20 tons Farmyard Manure. 4 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 4 cwt. Kainit.
4	20 tons Farmyard Manure. 4 cwt. Superphosphate. 2 cwt. Sulphate of Ammonia. 4 cwt. Kainit.
5	20 tons Farmyard Manure. 4 cwt. Superphosphate. 2 cwt. Sulphate of Ammonia. 4 cwt. Salt.
6	4 cwt. Superphosphate. 2 cwt. Nitrate of Soda. 4 cwt. Kainit.
7	4 cwt. Superphosphate. 2 cwt. Nitrate of Soda. 4 cwt. Salt.
8	4 cwt. Superphosphate. 2 cwt. Sulphate of Ammonia. 4 cwt. Salt.

All manures to be applied before seed is sown.

IV.—POTATOES.

Size of Plot: One-twentieth Statute Acre.

The following kinds and quantities of manures will be used per statute acre :—

No. of Plot.	
1	15 tons Farmyard Manure.

No. of Plot.	
2	15 tons Farmyard Manure. 1 cwt. Sulphate of Ammonia. 4 cwt. Superphosphate. 1 cwt. Muriate of Potash.
3	15 tons Farmyard Manure. ½ cwt. Sulphate of Ammonia. 4 cwt. Superphosphate. 1 cwt. Muriate of Potash.
4	15 tons Farmyard Manure. 4 cwt. Superphosphate. 1 cwt. Muriate of Potash.
5	1½ cwt. Sulphate of Ammonia. 6 cwt. Basic Slag. 1½ cwt. Muriate of Potash.
6	1½ cwt. Nitrate of Soda. 6 cwt. Basic Slag. 1½ cwt. Muriate of Potash.
7	1½ cwt. Nitrate of Soda. 6 cwt. Superphosphate. 1½ cwt. Muriate of Potash.
8	1½ cwt. Sulphate of Ammonia. 6 cwt. Superphosphate. 1½ cwt. Muriate of Potash.

V.—MEADOW HAY EXPERIMENT.

Size of Plot : One-twentieth Statute Acre.

The following kinds and quantities of manures will be used per statute acre :—

No. of Plot.	
1	No Manure.
2	2 cwt. Basic Slag. 2 cwt. Kainit.
3	½ cwt. Nitrate of Soda. 2 cwt. Basic Slag. 2 cwt. Kainit.
4	1 cwt. Nitrate of Soda. 2 cwt. Basic Slag. 2 cwt. Kainit.
5	1 cwt. Nitrate of Soda. 2 cwt. Superphosphate. 2 cwt. Kainit.

The Basic Slag to be high grade (34 per cent. citric soluble phosphates) and the Superphosphate to contain 35 per cent. soluble phosphates.

VI.—POTATOES.

Manurial Test with Seaweed for Seaboard Localities.

Size of Plot: One-twentieth Statute Acre.

The following kinds and quantities of manures will be used per statute acre :—

No. of Plot.	
1	15 tons Farmyard Manure.
2	15 tons Seaweed.
3	15 tons Seaweed. 1 cwt. Sulphate of Ammonia. 4 cwt. Superphosphate. 1 cwt. Muriate of Potash.
4	15 tons Seaweed. 4 cwt. Superphosphate. 1 cwt. Muriate of Potash.
5	15 tons Seaweed. 1 cwt. Sulphate of Ammonia. 4 cwt. Superphosphate.
6	15 tons Seaweed. 4 cwt. Superphosphate.

Class of Seaweed used should be noted, and also time and method of application.

VII.—ROTATION EXPERIMENT WITH LIME.

Size of Plot: Quarter Statute Acre.

The lime to be applied to stubble after lea oats.

Plot 1. No lime.
,, 2. Slaked lime (weighed before slaking, slaked with water, and applied in the form of powder). Two tons per statute acre.
,, 3. Ground burnt lime. Two tons per statute acre.
,, 4. Ground limestone. Four tons per statute acre.

Results to be obtained and furnished each year for four years following application.

It is essential that in any season during which the experiment lasts only one crop should be sown over the acre comprised in the experiment, and that this crop should be cultivated and manured alike over the entire area. When the land is under green crop, potatoes, swedes, *or* mangels should be planted on the whole area.

For purposes of exact comparison it is essential that *all* the lime and limestone for the experiments, including the lime for Plot 2, shall be obtained from either of the two following sources, viz., The Carnlough Lime Co., Carnlough, Co. Antrim; or, The Askeaton Carbide Co., Askeaton, Co. Limerick. Instructors should themselves determine from which of these centres the lime can be most conveniently obtained.

January, 1915.

FORM A. 133 (*a*).
1915.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

ROYAL COLLEGE OF SCIENCE, DUBLIN,

SESSION 1915–16.

SCHOLARSHIPS IN AGRICULTURE, HORTICULTURE, FORESTRY, AND CREAMERY MANAGEMENT.

A limited number of scholarships will be offered in 1915 for competition among young men in Ireland who desire to acquire a thorough knowledge of Technical Agriculture, and, in addition, one or more scholarships will be provided for students who intend to specialise in either Horticulture, Forestry, or Creamery Management. Each scholarship includes—(1) free admission to the first year's course of instruction in the College, (2) one third-class railway fare to Dublin at the beginning of the session, and one third-class fare from Dublin at the end of the session, and (3) either of the following at the option of the Department—(*a*) a maintenance allowance of one guinea per week while in attendance at the Royal College of Science or elsewhere as the Department may decide; or (*b*) free board and residence at one of the Department's institutions; in the latter case a small grant will be made to each student towards the cost of books and apparatus.

A scholarship is tenable for one year, but selected candidates must undergo a probationary course of one term of about three months. If satisfactory progress be made by the holder, the scholarship may be renewed for a second, a third, and a fourth year, to enable the student to complete his course.

The Department do not undertake to employ, or find employment for, students at the close of the period of training.

Holders of these scholarships will be subject to the regulations made from time to time at the Royal College of Science, and will be required to devote their whole time to the course of study prescribed for them by the Department.

Candidates, who should be between 18 and 30 years of age on the 1st September, 1915, must make application on a form, which may be obtained from the Secretary, Department of Agriculture and Technical Instruction, Dublin, or the Registrar, Royal College of Science, Dublin, after the 1st February, 1915, and which should be returned not later than the 30th July, 1915.

Candidates must have been born in Ireland, or have been resident in Ireland for three years immediately prior to the 1st September, 1915.

Past and present students of the Royal College of Science for Ireland are ineligible as candidates.

The examination will take place in Dublin on the 11th, 12th, and 13th August, 1915. No expenses in connection with attendance at this examination will be allowed.

The subjects for the examination are:—

(1) English.
(2) *One* of the following: Latin, Irish, French, *or* German.
(3) Mathematics.
(4) Drawing.
(5) *One* of the following:—Agriculture, Horticulture, Forestry, *or* Dairying and Creamery Management.

SYLLABUSES OF THE EXAMINATION.

A.—ENGLISH.

(1) English Composition.

(2) Literature:

SHAKESPEARE: "Henry IV." (School Edition). (Philological questions will not be asked.)

MILTON "Lycidas."

ALEXANDER SMITH: Essays: "Dreamthorp"; "On the Writing of Essays": "Christmas"; "On the Importance of a Man to Himself"; "On Books and Gardens."

(3) Outlines of History:

Europe, with special reference to Ireland, Great Britain, and France, A.D. 1603 to A.D. 1760.

(4) Geography:

(*a*) Asia and Africa.

(*b*) The British Empire in Asia and Africa, in more detail.

(5) For general private reading: The works of Charles Dickens.

B.—*One* of the following:—

LATIN.
IRISH.
FRENCH.
GERMAN.

The examination will include passages to be translated into English from the books prescribed, together with questions in grammar and colloquial phrases, and a passage to be translated from English into the language selected. The books prescribed are as follows:—

LATIN.

VIRGIL : " Æneid," Book II.

CICERO : An easy Selection from Cicero's Correspondence (Duff).

IRISH.

O'LEARY : " Eisirt."

CRAIG : "Iasgaireaċt Ṡéumuis Ḃig."

FRENCH.

DAUDET : " La belle Nivernaise " (School Edition).

ORDONNEAU : " Valabrègue et Keróul " ; " Les Boulinard."

MOFFATT : "French Science Course" (University Tutorial Press).

GERMAN.

GERSTÄCKER : " Herrn Mahlhubers Reiseabenteuer."

SCHILLER : Poems, viz. : " Ritter Toggenburg " ; " Der Ring des Polycrates " ; " Die Kraniche des Ibycus, Die Bürgschaft " ; " Der Graf Von Habsburg, Der Handschuh " ; " Der Kampf mit dem Drachen."

MOFFATT : " German Science Course " (University Tutorial Press).

C.—MATHEMATICS.

The Syllabus in Mathematics will be the Pass Courses in Arithmetic, Geometry, Algebra and Trigonometry for the Middle Grade of the Intermediate Education Board's Examinations for 1915.

D.—DRAWING.

The Syllabus in Drawing will be the First and Second Years' Syllabuses of the Department's Programme for Day Secondary Schools.

E.—*One* of the following :—

AGRICULTURE.

HORTICULTURE.

FORESTRY.

DAIRYING AND CREAMERY MANAGEMENT.

Each applicant must have had substantial experience of practical work in connection with *either* farming, gardening, the management of woodlands, *or* dairying and creamery management. The examination may be written, oral, and practical. The subjects will include all the ordinary work of *either* farms, gardens, woods, *or* dairies as practised in Ireland. Under this head each applicant must present himself for examination only in the subject in which he desires a scholarship.

N.B.—On no account will a scholarship be awarded to a candidate who fails to attain a high standard in the subject he selects for this portion of the examination.

Marks will also be awarded on the ability of candidates to impart instruction as gauged by the style of the answers in both the written and the oral examinations.

Candidates who are qualified for scholarships by their examination on the foregoing subjects will be required to submit to an examination by a medical officer appointed by the Department. A scholarship will not be awarded in any case where the candidate is certified to be unfit to undertake the prescribed course of studies.

LAST DATE FOR RECEIVING APPLICATIONS, 30th JULY, 1915.

Form A. 153 (a).
1915.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

INSTRUCTION IN FRUIT-GROWING AND GENERAL GARDENING.

HORTICULTURAL SCHOOL,

ALBERT AGRICULTURAL COLLEGE, GLASNEVIN, DUBLIN.

SESSION, 1915-16.

The course provided at this School is suited for men who have already had experience in fruit-growing and general gardening, such as can be obtained by working for four or five years under a fully qualified gardener. In addition to the practical work in the gardens, class-room instruction is given to the students to enable them to understand the scientific principles underlying horticulture.

Applicants for admission to the 1915-16 session must be not less than twenty years of age, or more than thirty years, on the 1st October, 1915, in good health, and of strong constitution. They should have received a fair general education, and will be required to produce evidence that they have been employed regularly at garden work. They must have been born in Ireland or have been resident in Ireland for at least three years prior to 1st October, 1915.

Students will be admitted on probation as the result of an examination which will be held in Dublin on the 6th August, 1915. The subjects included in the examination will be :—

(1.) English—to be tested by dictation and a short letter.

(2.) Arithmetic—the first four rules, simple and compound ; a knowledge of weights and measures; and percentages.

(3.) Practical Fruit-growing and Gardening.

A high standard will not be expected in English or Arithmetic. The examination in practical fruit-growing and gardening will cover the whole range of these subjects.

No expenses will be allowed to candidates in connection with their attendance at this examination.

Successful candidates will be required to enter on their duties on the 12th October, 1915.

The session will close on the 30th September, 1916. Students may be retained at the School beyond that date, if, in the opinion of the Department, they would profit by an extension of the course.

Students are provided with furnished lodging, including coal and light, and receive an allowance of 14*s*. per week. They are required to find their own board.

Students of the Horticultural School are subject to such regulations regarding conditions of work, hours of attendance, etc., as may be made from time to time by the Department.

The Department do not undertake to employ or to procure employment for students at the close of the courses, but the names of those who qualify are sent to County Committees of Agriculture with an intimation that they are eligible for appointment by such Committees to instructorships under the Department's Scheme of Instruction in Horticulture and Bee-Keeping.

Several men who have passed through the School are now employed by County Committees of Agriculture.

Application to attend the examination must be made on the prescribed form, to be obtained from

THE DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

Last date for making application—11th July, 1915.

Form A 176 (c).
1915.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

AGRICULTURAL EDUCATION FOR YOUNG MEN.
Session 1915-16.

FARM APPRENTICESHIPS.

AGRICULTURAL SCHOOL, CLONAKILTY, COUNTY CORK.

Young men who intend to follow the farming profession in Ireland, and who desire to acquire a practical knowledge of its several branches, are admitted to the School as apprentices.

The farm is managed by an experienced agriculturist, under whose direction the apprentices are required to take part in all the work of the fields and of the farmyard, whether in connection with season-

able operations or permanent improvements. In the class-room attention is given, in the evenings and at other times when outdoor work is not pressing, to English, Arithmetic (including Surveying), Book-keeping and Technical Agriculture. This instruction is not intended as a preparation for any examination. It is of such a character as to continue the general education of the apprentices, and be useful to them in their future career as farmers.

Applicants for apprenticeships must be not less than seventeen years of age on the 1st October, 1915. Preference is given to those applicants who produce evidence that they have sure prospects of obtaining farms of their own, or *bona fide* employment at farming. If, in addition, such applicants have attended a course of instruction under the Department's Scheme of Winter Agricultural Classes they are allowed priority in order of admission to the School. It is also a recommendation if the applicant produces a certificate from the Itinerant Instructor in Agriculture for the County in which he resides that he has taken advantage of the Instructor's lectures and demonstrations and has shown a desire to improve his knowledge of tillage farming.

The apprentices are required to reside in the buildings attached to the School, where they are in the charge of a house master and matron.

The 1915-16 Session will commence on the 12th October, 1915, and will terminate on the 11th August, 1916. There will be two intervals, each of about a fortnight, during which the apprentices may return to their homes—one at Christmas and the other at Easter.

Admission as an apprentice is conditional on passing the entrance examination, producing certificates of good health and character and paying the required fee according to the scale indicated overleaf.

Applicants who have been pupils at Winter Agricultural Classes are exempted from the entrance examination, provided their attendance and progress at the Agricultural Classes have been satisfactory.

An apprentice is not retained at the School if he is found to be unable to perform a fair day's work, or to be otherwise unsuitable.

Entrance Examination.

The entrance examination in connection with the 1915-16 Session will be held in September, 1915. About ten days' notice of the arrangements for this examination will be given to each applicant.

The following subjects are included in the examination :—

Arithmetic—Simple calculations requiring a knowledge of weights and measures.

English—Dictation, Grammar and Composition.

The examination will be of such a nature as should present little difficulty to a young man who has passed the fifth standard at a National school.

No candidate is admitted whose general education is insufficient to enable him to profit by the class-room instruction, or who is, in the opinion of the Department, unsuitable in any other respect for an apprenticeship.

No expenses are allowed to candidates in connection with their attendance at the entrance examination.

Fees.

1. For apprentices whose parents or guardians derive their means of living mainly from farming in Ireland the inclusive fees for tuition, board, residence and ordinary medical attendance are proportional to the aggregate tenement valuation of their holdings, as follows:—

	Per Session.
Where the aggregate valuation does not exceed £20, ...	£3
Exceeds £20 but does not exceed £40, .	£6
Exceeds £40 but does not exceed £100, .	£10
Exceeds £100, ...	£15

2. For apprentices not included in the foregoing classes, £20

Apprentices are notified of the fees payable by them. Fees must be paid to the Principal on entrance, and in addition a sum of £1 must be deposited at the same time to cover the cost of repairs to clothes, the purchase of books, stationery, &c. The unexpended balance, if any, of this deposit is refunded at the close of the session.

Free Places.

The Committees of Agriculture for Counties Cork, Kerry, Kildare, Kilkenny, King's, Leitrim, Limerick, Queen's, Roscommon, Sligo, Tipperary (N.R.), Tipperary (S.R.), Waterford, Westmeath and Wexford, have made provision for scholarships tenable at an agricultural school during the 1915-16 Session. These scholarships will be offered for competition amongst the best students attending the Winter Agricultural Classes during the 1914-15 Session. Each successful competitor will be given the option, subject to certain conditions, of taking out his scholarship at Athenry, Ballyhaise or Clonakilty Agricultural School.

Outfit.

Apprentices are required to provide themselves with a proper outfit, particulars of which are supplied to the successful candidates.

Applications for Admission.

Application for admission must be made on the prescribed form to be obtained from—

The Department of Agriculture and
Technical Instruction for Ireland,
Upper Merrion Street, Dublin.

The applications will be dealt with in the order of their receipt in the Department's Offices. They should be forwarded not later than 11th August, 1915.

Form A. 176 (b)
1915.

Department of Agriculture and Technical Instruction for Ireland.

AGRICULTURAL EDUCATION FOR YOUNG MEN.
Session 1915-16.

FARM APPRENTICESHIPS.

AGRICULTURAL STATION, BALLYHAISE, CO. CAVAN.

Young men who intend to become farmers in Ireland are received at the Station for one year, as apprentices, for a course of practical training in several branches of farming. Instruction in the principles of the sciences underlying ordinary farm practice is also provided.

Apprentices are admitted without payment of any fee. They are required to take part in all the operations of the fields and of the farm yard. They must perform diligently all work assigned to them on the farm. Applicants are not admitted unless they are regarded as generally fitted to discharge the duties of an apprentice.

Technical instruction in the class-room is included in the course. During the spring and summer months such instruction is given only at times when the weather is unsuitable for outdoor work. The class-room instruction is of such a character as to continue the general education of the apprentices and be useful to them in their future career as farmers. It is not intended as a preparation for any examination.

Applications for apprenticeships may be made at any period of the year.

Applicants for apprenticeships tenable during the 1915-16 session must be not less than seventeen years of age on the 1st October, 1915.

Admission as an apprentice is conditional on producing certificates of good health and character.

Subject to passing a qualifying test as to their fitness from an educational point of view to take advantage of the course at the Station, and satisfying the Department that they are physically equal to the farm work of the Station, apprentices are admitted in the order of the receipt of their applications in the Department's offices. Preference is, however, given to those applicants who produce evidence that they have sure prospects of obtaining farms of their own, or *bona fide* employment at farming. If, in addition, such applicants have attended a course of instruction under the Department's Scheme of Winter Agricultural Classes, they are allowed

priority in order of admission to the Station. It is also a recommendation if an applicant produces a certificate from an Itinerant Instructor in Agriculture that he has taken advantage of the Instructor's lectures and demonstrations and has shown a desire to improve his knowledge of tillage farming. The Department do not guarantee admission to any applicant.

An apprentice is not retained at the Station if he is found unable to perform a fair day's work or to be otherwise unsuitable.

The apprentices are required to reside in the buildings attached to the Agricultural Station, where they are under the immediate supervision of the Principal.

The course will extend from the 12th October, 1915, to the 6th October, 1916. There will be an interval of about a week at Christmas during which the apprentices may return to their homes.

Scholarships.

The Committees of Agriculture for Counties Cork, Kerry, Kildare, Kilkenny, King's, Leitrim, Limerick, Queen's, Roscommon, Sligo, Tipperary (N.R.), Tipperary (S.R.), Waterford, Westmeath and Wexford have made provision for scholarships tenable at an agricultural school during the 1915-16 Session. These scholarships will be offered for competition amongst the best students attending the Winter Agricultural Classes during the 1914-15 Session. Each successful competitor will be given the option, subject to certain conditions, of taking out his scholarship at Athenry, Ballyhaise, or Clonakilty Agricultural School.

Outfit.

Apprentices are required to provide themselves with a proper outfit, particulars of which are supplied to applicants when they are being notified of their admission.

A sum of £1 must be deposited with the Principal on entrance to cover the cost of repairs to clothes, the purchase of books, stationery, etc. The unexpended balance, if any, of this deposit is refunded on the termination of the apprenticeship.

Applications for Admission.

Application for admission must be made on the prescribed form, to be obtained from—

THE DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET,
DUBLIN.

Latest date for making application for admission to the 1915-16 Session—11th September, 1915.

Form A. 176 (a).
1915.

Department of Agriculture and Technical Instruction for Ireland.

AGRICULTURAL EDUCATION FOR YOUNG MEN.
Session 1915–1916.

FARM APPRENTICESHIPS.

AGRICULTURAL STATION, ATHENRY, CO. GALWAY.

Young men who intend to become farmers in Ireland are admitted to the Station for one year, as apprentices, for a course of practical training in several branches of farming. Instruction in the principles of the sciences underlying ordinary farm practice is also provided.

Apprentices are admitted without payment of any fee. They are required to take part in all the operations of the fields and of the farm yard. They must perform diligently all work assigned to them by the Farm Manager or his foreman. Applicants are not admitted unless they are regarded as generally fitted to discharge the duties of an apprentice.

Technical instruction in the class-room is included in the course. During the spring and summer months such instruction is given only at times when the weather is unsuitable for outdoor work. The class-room instruction is of such a character as to continue the general education of the apprentices and be useful to them in their future career as farmers. It is not intended as a preparation for any examination.

Applicants for apprenticeships must be not less than seventeen years of age on the date of admission. Preference is given to those applicants who produce evidence that they have sure prospects of obtaining farms of their own, or *bona fide* employment at farming. If, in addition, such applicants have attended a course of instruction under the Department's Scheme of Winter Agricultural Classes, they are allowed priority in order of admission to the Station. It is also a recommendation if the applicant has attended a course of instruction held under the Department's Scheme of Winter Agricultural Classes, or if he produces a certificate from an Itinerant Instructor in Agriculture that he has taken advantage of the Instructor's lectures and demonstrations and has shown a desire to improve his knowledge of tillage farming.

The apprentices are required to reside in the buildings attached to the Agricultural Station, where they are under the immediate supervision of the Superintendent.

Admission as an apprentice is conditional on producing certificates of good health and character.

The course of study will extend from the 14th October, 1915, to the 13th October, 1916. There will be an interval of about a week at Christmas, during which the apprentices may return to their homes.

Applications for apprenticeships may be made at any period of the year. Subject to passing a qualifying examination, to test their fitness from an educational point of view to take advantage of the course at the Station, and satisfying the Department that they are physically equal to the farm work of the Station, apprentices are admitted in the order of the receipt of their applications in the Department's offices. The Department do not guarantee admission to any applicant. An apprentice is not retained at the Station if he is found unable to perform a fair day's work or to be otherwise unsuitable.

Scholarships.

The Committees of Agriculture for Counties Cork, Kerry, Kildare, Kilkenny, King's, Leitrim, Limerick, Queen's, Roscommon, Sligo, Tipperary (N.R.), Tipperary (S.R.), Waterford, Westmeath and Wexford have made provision for scholarships tenable at an agricultural school during the 1915-16 Session. These scholarships will be offered for competition amongst the best students attending the Winter Agricultural Classes during the 1914-15 Session. Each successful competitor will be given the option, subject to certain conditions, of taking out his scholarship at Athenry, Ballyhaise, or Clonakilty Agricultural School.

Outfit.

Apprentices are required to provide themselves with a proper outfit, particulars of which are supplied to applicants when they are being notified of their admission.

A sum of £1 must be deposited with the Superintendent on entrance to cover the cost of repairs to clothes, the purchase of books, stationery, etc. The unexpended balance, if any, of this deposit is refunded on the termination of the apprenticeship.

Applications for Admission.

Application for admission must be made on the prescribed form, to be obtained from—

THE DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET,
DUBLIN.

Latest date for making application for admission to the 1915-16 Session—11th September, 1915.

Form A. 134 (a).
1915.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

AGRICULTURAL STATION, BALLYHAISE, CO. CAVAN.

SESSION 1915-16.

CREAMERY COURSE.

[Subject to revision.]

Provision has been made at the Agricultural Station, Ballyhaise, for a course of technical instruction for young men who intend to become Creamery Managers.

The course to be held in the year 1915-16 will commence on Tuesday, 12th October, 1915, and will terminate on Friday, 10th March, 1916. There will be an interval of about a fortnight at Christmas.

The following subjects will be included in the course:—Physical Science in relation to Creamery work; Dairy Bacteriology; Dairy Technology; Dairy Engineering; Business Methods.

The course will be particularly suitable for those who have had experience of creamery work.

Students who intend to compete for certificates under the Department's scheme for improvement in the management of creameries will have special facilities for the study of the subjects prescribed for the examination in connection with these certificates which is to be held in March, 1916.

At the close of the technical course at Ballyhaise Agricultural Station, a limited number of the best students will be afforded facilities for learning the practice of Creamery Management during the summer of 1916, in selected creameries in Ireland. Such students will receive a maintenance allowance at the rate of ten shillings per week, in addition to free instruction, while in attendance at the creamery.

Applicants for admission to the course must be at least eighteen years of age on the 1st October, 1915.

Admission is conditional on passing the entrance examination, producing certificates of good health and character, and paying the specified fee.

Applicants who fulfil the foregoing conditions are admitted in the order in which their applications, on Form A. 134, are received in the Department's offices, preference being given, however, to those who have experience of creamery work, extending over at least one season in a creamery.

Students are required to take part, as directed by the Principal, in all branches of the outdoor work of the Station which relate to dairying. They must conform strictly to the disciplinary rules in force at the Station.

Entrance Examination.

The Entrance Examination for the 1915-16 course will be held in August, 1915. Each applicant will receive about ten day's notice of the arrangements for this Examination.

The following subjects are included in the examination :—

Arithmetic.—Calculations requiring a knowledge of weights and measures, decimal and vulgar fractions, areas, volumes and percentages.

English.—Dictation. Grammar and Composition.

No applicant will be admitted who fails to satisfy the Department that his education and experience are such as to enable him to follow the course satisfactorily.

No expenses will be allowed to candidates in connection with their attendance at this examination.

Fee.

The fee for tuition, board, residence, laundry and ordinary medical attendance during the course will be £10.

The fee must be paid to the Principal of the Station on entrance, and, in addition, a sum of £1 must be deposited at the same time to cover the cost of repairs to clothes, the purchase of books, stationery, &c. The unexpended balance, if any, of this deposit will be refunded at the close of the course.

Free Places.

Free places at the course will be offered to a limited number of *bona fide* managers of creameries or auxiliary creameries of at least three years' standing.

An applicant to whom a free place is granted will be required, like other students, to lodge with the Principal on entrance the fee of £10 and the deposit of £1 above mentioned, but in his case the amount of the fee will be refunded to him at the conclusion of the course. The Department, however, reserve the right to retain the fee if the applicant fails to take full advantage of the course.

Outfit.

Students will be required to provide themselves with a proper outfit, particulars of which will be supplied to the successful candidates.

Applications for Admission.

Application for admission must be made on the prescribed form to be obtained from—

The Department of Agriculture and
Technical Instruction for Ireland,
Upper Merrion Street, Dublin.

Separate forms of application are prescribed for free place and for paying students.

Applications should be forwarded as soon as possible. The latest date for making application will be 2nd August, 1915.

Form A. 181 (a).
1915.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

FORESTRY INSTRUCTION.

A limited number of apprenticeships in Forestry will be awarded on the result of an examination which will be held in Dublin on the 2nd September, 1915.

Applicants for apprenticeships must be not less than eighteen years of age and not more than twenty-five years on the 1st October, 1915. They should be in good health, and of strong constitution, and have received a fair general education. Preference will be given to those applicants who have had experience of work in woods.

The subjects included in the examination will be—

English—to be tested by dictation and a short letter.

Arithmetic—the first four rules, simple and compound; a knowledge of weights and measures, proportion, percentages, and of the elements of the mensuration of lengths, areas and volumes.

No expenses will be allowed to candidates in connection with their attendance at this examination.

The successful candidates will be required to work, under the directions of a skilled foreman, for at least two years, at one of the Forestry Centres belonging to the Department. During this period apprentices will be given facilities for improving their general education.

Apprentices will be required to enter on their duties on the 1st October, 1915.

Each apprentice will receive an allowance at the rate of 14s. per week, with furnished lodging. When in receipt of this allowance the apprentices will be required to find their own board.

Apprentices must undertake to conform with the rules and regulations made from time to time in connection with their work at the Forestry Centre to which they are assigned.

The engagement between apprentices and the Department may be determined at any time by one week's notice on either side.

The Department do not undertake to employ or to procure employment for apprentices on completion of their training.

Applications for apprenticeships must be made on the prescribed forms to be obtained from—

THE DEPARTMENT OF AGRICULTURE
AND TECHNICAL INSTRUCTION,
UPPER MERRION STREET,
DUBLIN.

Last date for making application—21st August, 1915.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

COMPENSATION FOR GOOSEBERRY BUSHES (CO. MEATH) ORDER, 1915.

The Department of Agriculture and Technical Instruction for Ireland, by virtue and in exercise of the powers conferred upon them by the Destructive Insects and Pests Acts, 1877 and 1907, an with the consent of the County Council of Meath, do order, and it is hereby ordered, as follows :—

(1) The County Council of the County of Meath are hereby authorised to pay out of the local rate compensation, as prescribed by the Destructive Insects Act, 1877, Section 3, for gooseberry bushes destroyed in County Meath in compliance with Notices served under the American Gooseberry Mildew and Black Currant Mite (Ireland) Order, 1912.

TITLE.

(2) This Order may be cited as The Compensation for Gooseberry Bushes (County Meath) Order, 1915.

In witness whereof, the Department of Agriculture and Technical Instruction for Ireland have hereunto affixed their Seal this Third day of March, 1915.

[L. S.]

(Signed) J. V. COYLE,
On behalf of the Secretary.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

WARNING.

SALE OF HAYSEED.

Proprietors of hay stores, farmers, retailers, and others are warned not to dispose of the sweepings of hay-lofts or similar materials for use as agricultural seed. Such materials, whether used alone or with good seed, are totally unfit for sowing on land with a view to producing hay or pasture. They often infest land with noxious weeds or worthless grasses.

At a recent Quarter Sessions in Co. Cork a farmer sued a retailer who sold him so-called "hayseed" of this description. The farmer obtained a decree for £8 damages and £4 expenses, as well as costs.

Particulars of the grasses and mixtures recommended by the Department for laying down land to pasture will be found in Leaflet No. 42.

Copies of this Leaflet may be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

SCHEME FOR ENCOURAGING IMPROVEMENT IN THE MANAGEMENT OF CREAMERIES.

EXAMINATION FOR CREAMERY CERTIFICATES, MARCH, 1915.

In connection with the above-mentioned scheme, an examination in Dairy Technology, Dairy Bacteriology, Dairy Engineering, Physical Science and Business Methods, as applied to Creamery Management, is held annually by the Department.

Certificates of having passed the examination held on 9th, 10th, and 11th March, 1915, were awarded to the undermentioned candidates, whose names are given in alphabetical order :—

Mr. Michael Barrett, Glashabee, Mallow.
Mr. Richard Brennan, Killeen Co-operative Agricultural Dairy Society, Killeen, Nenagh.
Mr. Maurice N. Cotter, Knockbrack, Knocknagoshel, Co. Kerry.
Mr. Jeremiah T. Kelleher, The Creamery, Terelton, Macroom.
Mr. John J. Lanigan, Urard, Urlingford, Co. Kilkenny.
Mr. Denis Lyons, Gurranleigh, Crookstown, Co. Cork.
Mr. John M. Manahan, Ballylanders, Knocklong.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

TESTING OF FLAX SEED, 1915.

Owing to the restrictions which the Governments of Russia and Holland deemed advisable to put upon the export of flax seed during the past winter, Irish importers of this commodity have had to cope with unprecedented conditions, and intending growers have, as a result, not been in a position to exercise in the selection of their seed the same choice as in former years.

It has been reported to the Department that a considerable quantity of flax seed was harvested in Ireland in 1914. The germination of much of this seed when tested during the winter proved satisfactory. The Department would, however, again remind growers that Irish seed is very liable to lose its germinating power if separated from the bolls and stored in bags during the winter. In fact a sample of Irish seed which tested as high as 95 per cent germination a few months ago may now germinate only 60 per cent. The Department are also informed that sales of Riga and Dutch seed of 1913, and even of 1912 growth, have been effected. Such seed may safely be sown if it tests well. It is also reported that some seed derived from sources not generally availed of by Irish importers is now in the hands of growers; and finally that many growers have of necessity had to purchase brands other than those to which they or their neighbours have been accustomed.

Growers fully realise the importance in the cultivation of flax of securing a good braird. The utility of a germination test as a means of obtaining a braird of proper thickness is not, however, so generally recognised. In case the germination of a sample, as determined by the test, is relatively low, a braird of normal thickness may, of course, be secured by sowing a proportionately greater quantity of seed.

To obviate risk of loss from unsatisfactory brairds the Department would urge upon all flax growers the advisability of having their seed tested at the Seed Testing Station, where, for a nominal charge of 3*d.* per sample, its germination and purity will be determined. Not only is this practice advisable but it is, indeed, a necessity for growers who intend to sow (1) Irish seed, (2) Riga or Dutch seed harvested in 1912 or 1913, (3) seed imported from countries other than Russia or Holland, or (4) any seed of doubtful quality, if such growers are to make certain of a satisfactory braird, which is so essential in securing a good crop.

Special envelopes for forwarding samples for testing may be had free of charge and post free on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, 4 Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

TABLE SHOWING RATES FOR SOWING FLAX SEED ACCORDING TO ITS GERMINATION.

When the Standard Rate of Sowing Seed which gives a Germination of, approximately, 95% is :—	Per Statute Acre						Per Cunningham Acre						Per Irish Acre					
	6½ Pecks		7 Pecks		7½ Pecks		8 Pecks		8½ Pecks		9 Pecks		10 Pecks		11 Pecks		12 Pecks	
	Pcks.	Qts.	Pcks.	Qts.	Pcks.	Qts.	Pcks.	Qts.	Pcks.	Qts.	Pcks.	Qts.	Pcks.	Qts.	Pcks.	Qts.	Pcks.	Qts.
Then of Seed which germinates 100% sow	6	1	6	5	7	1	7	5	8	1	8	4	9	4	10	4	11	3
,, ,, 95 ,,	6	4	7	0	7	4	8	0	8	4	9	0	10	0	11	0	12	0
,, ,, 90 ,,	6	7	7	3	7	7	8	4	9	0	9	4	10	4	11	5	12	5
,, ,, 85 ,,	7	2	7	7	8	3	9	0	9	4	10	1	11	1	12	2	13	3
,, ,, 80 ,,	7	6	8	3	8	7	9	4	10	1	10	6	11	7	13	0	14	2
,, ,, 75 ,,	8	2	8	7	9	4	10	1	10	6	11	3	12	5	14	0	15	2
,, ,, 70 ,,	8	7	9	4	10	1	10	7	11	4	12	2	13	5	15	0	16	2

Thus, if a Grower is accustomed to sow, say, 7 pecks per statute acre of normally good seed, and finds his present supply of seed germinates only 85%, he should sow it at the rate of 7 pecks and 7 quarts per statute acre in order to secure a braird of normal thickness.

It should be observed that (1) the sowing of seed which germinates badly is attended with risk as it is probable that those pickles which germinate in such seed may have had their vitality seriously impaired, and, consequently, only in very exceptional circumstances should seed be used if it germinates 75% or less; (2) if the pickles are large or "bold" a somewhat higher rate of sowing should be adopted, and if small a somewhat lower rate; (3) the above Table has reference to Imperial Measure, i.e., 1 peck=¼ bushel=2 gallons=8 quarts; and (4) a "bag" of seed contains 14 pecks, i.e., 3½ bushels.

II.—TECHNICAL INSTRUCTION.

Form S. 41.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

SUMMER COURSES OF INSTRUCTION FOR TEACHERS, 1915.

The Summer Courses of Instruction for Teachers to be conducted by the Department during the present year, and of which details are given below, will, with the exception of the Course of instruction in Rural Science (including School Gardening) for National School Teachers, begin on Tuesday, 6th July, and close on Friday, 30th July. The Course in Rural Science (including School Gardening) will begin on Tuesday. 3rd August, and close on Friday, 27th August.

A Course in any subject will not be arranged for unless a sufficient number of satisfactory applications are received.

Should the applications for any Course exceed the number for which it is proposed to provide accommodation, those applicants will be selected whose admission would appear most likely to prove beneficial. Teachers who have attended Summer Courses of instruction in previous years, and who have been giving instruction in the subjects of those Courses during the present session, will have priority of claim for admission to advanced Courses.

It is important that teachers should not apply unless they know that they will be able to attend, for much inconvenience, as well as injustice to others, may be entailed by applicants failing to take advantage of admission which may be granted. Failure to attend the Course after the invitation has been accepted, will, except in the case of illness, be regarded as an abuse of the privilege; and any teacher failing in this respect will not be admitted to any future Course.

Teachers who are selected for, and who attend, the Course of instruction regularly and punctually at the specified hours, from the beginning to the end of the Course, will be allowed a sum of £3 10*s*. towards their expenses while living at the centre; and those who travel more than twenty miles to the centre of instruction will be allowed, in addition, Third Class Railway Fare for one return journey from the railway station nearest their school. Teachers attending Courses conducted at the Irish Training School of Domestic Economy may, however, be required to reside at the school, and in that case only the allowance in respect of railway travelling, as above, will be made.

The hours of attendance will be, except in the case of teachers attending the classes in Drawing and Modelling at the Metropolitan School of Art, Dublin, from 9.15 a.m. to 3.15 p.m. daily (with an interval from 12 noon to 1 p.m. for luncheon), except on Saturdays, when the hours of attendance will be from 9.15 a.m. to 12.15 p.m. All teachers attending the Courses will also be required in the evenings to write out notes, etc.

Teachers desiring to take advantage of these Courses must fill up

and return the appropriate form of application (*see below*) as early as convenient, but in any case so as to reach the Offices of the Department not later than the 31st March.

N.B.—These Courses are open only to those who are over Twenty years of age, and, except in certain cases specified below, only to Teachers who are engaged (*a*) by local Committees of Technical Instruction; or (*b*) in Schools receiving grants either directly from the Department or under the provisions of an approved local Scheme of Technical Instruction.

DETAILS OF THE COURSES.

I.—Chemical Manufactures.

This Course is intended mainly for teachers of Chemistry in Technical Schools. Applicants for admission to the Course should hold a University Degree in Chemistry, or equivalent qualifications.

The lecture course will deal with selections from the following subjects:—The sulphuric acid industry and its applications in the manufacture of alkali phosphatic manures and commercially important sulphates. The chemistry of hypochlorites and chlorates and the manufacture of bleaching powder and potassium chlorates. The commercial application of silica and silicates in the production of glass glazes, bricks, earthenware and porcelain. Iron, copper and aluminium minerals and their metallurgical treatment. The fixation of atmospheric nitrogen and its commercial applications. The destructive distillation of coal, peat and wood.

Each Teacher-student will perform a suitable selection of preparations and analyses in the following branches of technical chemistry: —Sulphuric acid and its industrial applications. Alkali manufacture. Estimation of available chlorine in hypochlorites and chlorates. Extraction of iodine from kelp. Preparation of pure iodine. Preparation and analysis of barium salts from barytes. The testing of refractory materials. Assay of iron and copper ores. Preparation of aluminium and its technically important compounds. Calorific value of fuels.

Application for admission to this Course must be made on Form S. 305.

II.—Testing and Working of Electrical Machines.

This Course is intended for teachers and assistant teachers of Electrical Engineering in Technical Schools. The course of instruction will include—*Direct Current*:—Description, theory and action of direct current machines, component parts, armature and field windings. Performance and efficiency tests of direct current generators; effects of armature reaction. Testing of direct current motors, starting and regulating apparatus, brake efficiency and speed tests. Panel equipment for direct current machines. *Alternating Current*:—Description, theory and action of alternating current machines, component parts, armature and field windings. Testing of single phase and polyphase machines, circuits and transformers, use of the oscillograph: frequency meters, alternating current watt-meters, ammeters and voltmeters. Measurement of power in single phase and polyphase circuits by watt-meters and

other methods. The starting and testing of three phase induction motors. Rotary converter, synchronising devices for rotary converters. Panel equipment for alternators.

Application for admission to this Course must be made on Form S. 305.

III.—Technology for Teachers of Introductory English and Mathematics in Technical Schools.

The object of this Course is to indicate to teachers of Introductory Courses in Technical Schools the character of the specialised instruction which their students are likely to take up in succeeding sessions. It is intended to enable teachers to make their instruction more truly preparatory to a Specialised Course.

The instruction given will include lectures on the technology of materials, and the sources, manufacture, and general properties of selected materials, such as coal, iron, lead, copper, alloys, woods, building stones, leather, etc. Lectures will be given on the steam engine and on some workshop processes. Instruction will also be given in Mechanical Drawing. Opportunites will be afforded for the making of dimensioned hand sketches and of plans and elevations. Exercises in Practical Geometry, such as the development of simple surfaces, will be carried out. The Course will further provide instruction in Workshop Mathematics of a practical type.

Application for admission to this Course must be made on Form S. 305.

IV.—Office Routine and Business Methods.

First and Second Year Courses will be held. These Courses are intended for teachers in Technical Schools who are giving instructions in such subjects as Shorthand, Commercial Correspondence, Commercial Arithmetic, and Book-keeping. The Course will include instruction in Business Methods and the keeping of accounts, in the methods of calculation used in commercial life, and in the routine methods and operations common in office work. Reference will be made to the equipment necessary for classes in elementary commercial subjects, and to the methods of conducting such classes. Examinations will be held at the close of the Courses.

Application for admission to these Courses must be made on Form S. 305.

V.—Practical Mathematics and Mechanics.

Elementary and advanced Courses will be held. These Courses are intended for teachers of Building Trades and Engineering subjects in Technical Schools, and for the further training of Manual Instructors who have attended the special training courses conducted by the Department. Examinations will be held at the close of the Courses.

Application for admission to these Courses must be made on Form S. 147.

VI.—Manual Training (Metal Work).

This Course is intended mainly for teachers of Manual Instruction in Day Trades Preparatory Schools. The Course will be registered

by the Department of Technology of the City and Guilds of London Institute, but all teachers attending will be required to present themselves for the examinations which will be held at the close of the Course.

Application for admission to the Course must be made on Form S. 147.

VII.—Furniture Design.

This Course is intended for teachers of Cabinet-making and Woodwork. The instruction will include general principles of design in furniture and interior woodwork and accessory fixtures; the influence of material and fundamental constructions; enrichment by carving, inlay, painting and metalwork. The study of historic examples as precedents to original design will form an important feature of the work. Drawings and Designs will be made, to scale and full size, for workshop requirements. Teachers selected for this Course may attend the ordinary school class in Woodcarving.

Application for admission to the Course must be made on Form S. 147.

VIII.—Wheelwright's Work.

This Course is intended mainly for teachers of Woodwork in rural districts. The Course will include lectures on the nature and properties of the timbers and metals employed in the construction of wheeled vehicles, and the forms and characteristics of the kinds of axles in general use and their suitability for various types of carts and vans. Lectures on the making of wheels will also be given, and instruction on painting, lining and varnishing provided.

A considerable portion of the instruction will be in the drawing to scale of carts and their component parts.

Application for admission to the Course must be made on Form S. 147.

IX.—Life Drawing and Figure Composition.

This Course is intended for teachers in Schools of Art and Art Classes in Technical Schools. If there should be sufficient accommodation, the Department will be prepared to admit also a strictly limited number of advanced Art students. Opportunities to study in the National Museum of Science and Art will be afforded to teachers and students attending the Course.

Application for admission to this Course must be made on Form S. 143.

X.—Lithography.

Admission to this Course will be limited to those who attended the Course in this subject held in July, 1914.

The Course will include lectures on the materials used, on the mixing of colours, etc., and practical work—drawing on stone, transferring, printing by means of hand press, etc.

Application for admission to this Course must be made on Form S. 143.

XI.—Lettering and Illumination.

This Course is intended for teachers in Schools of Art and Art Classes in Technical Schools, as a medium for instruction in Decora-

tive Design. The instruction will follow the development and modification of letter characters from the Roman originals with particular attention to the work of the Irish Scribes. The use of lettering for ordinary conditions, such as posters and display work of all kinds, and for addresses, etc., will form part of the instruction.

Application for admission to this Course must be made on Form S. 143.

XII.—Coloured Embroidery.

This Course is intended mainly for teachers in Schools of Art and Art Classes in Technical Schools. The Course will include instruction in the requisites for Embroidery, materials and objects suitable for embroidering upon, and the different stitches used in Embroidery.

Application for admission to this Course must be made on Form S. 143.

XIII.—Advanced Cookery.

This Course will be arranged in order chiefly to meet the needs of Instructresses in Urban Technical Schools. Instruction and practice will be afforded in the more complicated processes and methods required for Third and Fourth Year Cookery Courses in such schools.

Application for admission to the Course must be made on Form S. 146.

XIV.—Advanced Dressmaking.

This Course is intended primarily for the further training in this subject of teachers holding the diploma of the Irish Training School of Domestic Economy, but applications from other teachers of Domestic Economy subjects will be considered. The Course will include the making of coats and skirts, fancy blouses, house frocks, etc., in up to date styles and methods.

Application for admission to the Course must be made on Form S. 146.

XV.—Hygiene and Sick Nursing.

Elementary and advanced Courses will be held. Only teachers who have already satisfactorily attended a Course in the subject, conducted by the Department, will be admitted to the advanced Course.

The Courses are primarily intended for teachers of Domestic Economy, at present engaged under Local Authorities, to enable them to obtain further practical knowledge of the laws of health, and of first aid and home nursing, so that they may be able to introduce into their courses simple and well-directed instruction in these subjects.

Applications will also be considered from District nurses who desire to give instruction in the subject under local schemes of Technical Instruction.

The Courses will include only as much Human Physiology as is necessary for the proper understanding of the laws of health, and will deal largely with rural and personal hygiene, first aid to the injured, and the care of the young and of the sick in their own homes.

The instruction will include practical work, and examinations will be held at the close of the Courses.

Application for admission to these Courses must be made on Form S. 146.

XVI.—Lace-Making, Crochet Work, and Sprigging.

The object of the Course will be to improve existing kinds of work, and not necessarily to introduce new forms. The instruction may include Carrickmacross Lace-making, Limerick Lace-making, Crochet Work (Clones and Raised), Crochet Point, and Sprigging.

The lessons on each of these subjects will include instruction in technique, the use of suitable materials, the preparation of working tracings, and practice in drawing and design.

Teachers selected to attend this Course, who also attended the similar Course held in July, 1914, may be required to show examples of their work done during the present school session and based on the instruction given at the Summer Course last year.

Certificates of satisfactory attendance and progress will be awarded at the close of the Course to those who have attended regularly and worked well, and whose work is of a sufficiently high standard, as shown by the specimens produced during the class-lessons and by any tests of a written or practical character which it may be considered desirable to apply.

Application for admission to the Course must be made on Form S. 140.

XVII.—Experimental Science.

Admission to the Courses of instruction in Experimental Science of the Department's Programme for Day Secondary Schools will be restricted to teachers in Secondary Schools in which the Programme has been adopted.

Provided that a sufficient number of applications are received, Courses will be held in the Second Year Syllabus of the Preliminary Course, and in each of the Special Courses, of the Department's Programme.

The Courses will not only cover the subject matter of the syllabuses of the Department's Programme, but will aim directly at bringing home to teachers the intentions of the Department as expressed in the prefatory note thereto.

Teachers applying for admission to the Courses in the Third and Fourth Year Syllabuses of the Special Courses of the Programme will be expected to have done some reading in the subject of the Course for which they apply.

Provisional recognition to teach the subject of the Course will be accorded to those teachers who have punctually and regularly attended and successfully done the class work, as testified by laboratory note books, and by the examinations, written and practical, which will be held at the close of the Course.

Application for admission to these Courses must be made on Form S. 42.

(Note.—The Course in the Second Year Syllabus to be held this year will be the last Summer Course of Instruction in the Preliminary Course of Experimental Science to be conducted by the Department. The Summer Courses in the Special Courses of the Programme will be continued for the present.)

XVIII.—Drawing and Modelling.

Facilities to attend the Metropolitan School of Art, Dublin, during the month of July, will be afforded to a limited number of teachers in Day Secondary Schools, in which the Department's Programme has been adopted, who are at present teaching Drawing, or who may desire to become teachers of Drawing, in such Schools. Applicants for admission to this Course should have received some previous training in Art subjects.

These facilities will not be offered to persons residing, or teaching in schools, within ten miles of Dublin, Belfast, Cork, Londonderry, Limerick, or Waterford.

Teachers selected to attend the Metropolitan School of Art under these conditions will be required to attend such classes as the Headmaster of the School may direct. They will be required to attend the School punctually and regularly during the ordinary school hours of Morning Classes (*see School Programme*), and also the special classes which will be held on Saturdays from 9.15 a.m. to 12.15 p.m. Attendance at Evening Classes is optional.

Application for admission to the Metropolitan School of Art under the foregoing conditions must be made on Form S. 42.

XIX.—Domestic Economy.

These Courses are intended for teachers who have already secured provisional recognition to give instruction in the Preliminary Course of Experimental Science of the Department's Programme for Day Secondary Schools, and who desire to obtain recognition as teachers of Domestic Economy in such Schools.

Recognition to teach Domestic Economy in Day Secondary Schools during the Session 1915–16 will be given to those teachers who have punctually and regularly attended, and successfully done the class work, as testified by note-books and by the examinations, written and practical, which will be held at the close of the Courses.

Teachers who have successfully attended three Summer Courses in Domestic Economy, under the conditions referred to above, and who have taught the subject for two complete sessions to the satisfaction of the Department's Inspectors, will be recognised as qualified to give instruction, in Day Secondary Schools, in the Preliminary Course in Experimental Science of the Department's Programme and in the Syllabuses of Domestic Economy. (*See Circular* 25.)

Application for admission to these Courses must be made on Form S. 42.

XX.—Manual Training (Woodwork).

The object of this Course is to provide training for teachers engaged in Day Secondary Schools so as to enable them to qualify to teach the subject in such Schools. The full course of training is designed to extend over two years. The work of the first year will consist of a Course of Drawing and Benchwork such as is set out in the Department's Programme for Day Secondary Schools. Recognition to give instruction in the subject in such Schools during the Session 1915–16 will be accorded to those teachers who succeed in passing the first year examination. The work of the second year will cover a more extended course of Drawing and Benchwork, and, in

addition, time will be devoted to the study of the theory of the subject, such as the management of classes, preparation of lessons, selection of tools and other equipment, etc. Those passing the second year examination will receive provisional recognition as teachers of the subject, which provisional recognition will be confirmed within five years of the date when first accorded, if the conditions of Circular 24 are complied with, or such further tests passed as may be subsequently prescribed by the Department. The Course will be registered by the Department of Technology of the City and Guilds of London Institute, but all teachers attending will be required to present themselves for the examinations to be conducted at the close of the Course.

Although this Course is primarily intended for the training of teachers in Day Secondary Schools, applications will be considered from teachers in other Schools working in connection with the Department.

Application for admission to the Course must be made on Form S. 42.

XXI.—Rural Science (Including School Gardening).

Except in special circumstances, only those teachers will be admitted to the Courses in this subject who have been recognised by the Commissioners of National Education as qualified to teach the syllabus of Elementary Experimental Science and Object Lessons of the Commissioners' Programme. Only those teachers who have successfully attended a Course in the First Year Syllabus of Rural Science (including School Gardening) will be eligible for admission to the Course in the Second Year Syllabus.

Teachers selected for the Course in the First Year Syllabus will be required to attend at the Royal College of Science, Dublin, for the first week, and, during the remainder of the Course, either at the Albert Agricultural College, Glasnevin, or the Technical School Garden, Kingstown, as may be decided by the Department. Teachers selected for the Course in the Second Year Syllabus will be required to attend at Glasnevin or Kingstown, as above, for the first week, and at the Royal College of Science for the remainder of the Course.

The teachers to be admitted to the Course in the First Year Syllabus will be nominated by the Commissioners of National Education, and the Department cannot enter into correspondence with any of the applicants who may not be selected for admission. Application for this Course will be accepted only from men teachers.

Teachers who attend the Courses punctually and regularly and pass the examinations, written and practical, held at the close, will be recognised by the Commissioners of National Education as qualified to give instruction in the subject in National Schools. Teachers who have successfully attended Courses in both the First and Second Year Syllabuses will be granted a certificate of proficiency in the subject.

Application for admission to these Courses must be made on Form S. 297.

Form S. 141.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

CONDITIONS UNDER WHICH THE DEPARTMENT WILL ACCORD RECOGNITION TO SUMMER COURSES OF INSTRUCTION FOR TEACHERS IN DAY SECONDARY SCHOOLS, CONDUCTED AT LOCAL CENTRES, 1915.

(*For particulars of the Public Courses conducted by the Department see Form S.* 41.)

(1) Courses may be held in Experimental Science, Drawing and Modelling, and Domestic Economy.

(2) Only those teachers may be permitted to attend the Courses whose admission thereto has been sanctioned, in writing, by the Department. The admission of teachers under 20 years of age will not be sanctioned. A course which is to be attended by fewer than five teacher-students will not as a rule be recognised under these Conditions.

(3) Courses must begin on Tuesday, the 6th July, and close on Friday, the 30th July.

(4) The hours of attendance of Teacher-students will be from 10 a.m. to 4 p.m. daily (with an interval of one hour for lunch) except on Saturdays, when the hours of attendance will be from 10 a.m. to 1 p.m. In addition teachers will be required in the evenings to write out notes, etc. The Department are prepared to consider applications for alternative arrangements, provided they allow of an equal period for teaching.

(5) The Instructors appointed to conduct Summer Courses must be specially qualified, and specifically recognised by the Department to conduct training courses for teachers.

(6) Except in the case of Drawing and Modelling, the Department will not approve of a class of more than ten students under one instructor. Assistant instructors must hold the Irish Secondary Teachers' Certificate in the subject of the Course, or equivalent qualifications.

(7) Concurrent instruction in different years' syllabuses of the same subject may be sanctioned if the conditions under which such instruction is to be given are regarded as suitable by the Department. Permission for concurrent instruction of classes in different subjects will not be given unless in very exceptional circumstances.

(8) Courses conducted under these conditions will be recognised for grants under the terms of Section III. of the Department's Programme for Technical Schools and Classes.

(9) Application for permission to conduct Courses under these Conditions should be made, not later than the 15th March, by letter, stating the subject or subjects in which it is proposed to provide instruction. The names of the instructors by whom it is proposed that Courses should be conducted should be submitted for approval as early as possible. The Time Table of the classes must be furnished, on Form S. 54, not later than the 1st June.

(10) Teachers desiring to attend Courses must apply for permission,

on Form 142, through the Managers of the Institution at which the Course desired is to be held. The Department will, on application, after the 15th March, furnish a list of the Institutions which have applied for the recognition of Courses, Teachers must make their own arrangements for their accommodation at these Courses.

DETAILS OF THE COURSES.

Experimental Science.

The subjects of the Courses of instruction may be :—First and Second Years of the Preliminary Course; Third and Fourth Year Special Courses in Physics, Chemistry, Botany, Physiology and Hygiene, and Physical and Commercial Geography.

The Courses should not only cover the subject matter of the Syllabuses of the Department's Programme for Day Secondary Schools, but should aim directly at bringing home to Teachers the intentions of the Department as expressed in the Prefatory Note thereto.

Provisional recognition to teach the subject of the Course will be accorded to those teachers who have punctually and regularly attended and successfully done the class work, as testified by Laboratory note-books, and by the examinations, written and practical, which will be held towards the close of the Course.

Drawing and Modelling.

These Courses will provide further training for Teachers who hold the Irish Secondary Teachers' Drawing, or higher, Certificates, and will also provide the requisite training for candidates for the Teaching Certificates issued by the Department under the conditions of Form S. 240. Attendance at these Courses does not confer a right to recognition as teachers of Drawing. *The Department will not arrange for special examinations at the close of Courses in this subject.*

Domestic Economy.

These Courses may be arranged for Teachers who have already obtained provisional recognition to give instruction in the Preliminary Course of Experimental Science of the Department's Programme for Day Secondary Schools, and who desire to obtain recognition as teachers of Domestic Economy in such Schools. The Course of instruction must include Cookery, the elements of Physiology and Hygiene, and Home Sewing, and should also include instruction in Laundry work.

Recognition to teach Domestic Economy in Day Secondary Schools during the forthcoming Session will be given to those teachers who have punctually and regularly attended and successfully done the class work, as testified by note-books and by the examinations, written and practical, which will be held towards the close of the Courses. Teachers who successfully attend three Summer Courses in Domestic Economy, under the conditions referred to above, and who teach this subject for two complete Sessions to the satisfaction of the Department's Inspectors, will be recognised as qualified to give instruction, in Day Secondary Schools, in the Preliminary Course of the Department's Programme of Experimental Science, and in the Syllabuses of Domestic Economy. (See Circular 25.)

Form S. 814.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

SCHOLARSHIPS AT THE KILLARNEY SCHOOL OF HOUSEWIFERY.

The Department are prepared to offer to County Committees of Technical Instruction special facilities for the award of Scholarships for Girls, tenable at the Killarney School of Housewifery. This institution is under the Department's direct control and has for its object the Training of Girls in such work as would fit them for domestic service or the care of a home.

The following are the conditions under which Scholarships may be awarded :—

1. Applicants for the Scholarships must be resident in a rural district, and must have been in regular attendance at one of the Courses of Instruction in Domestic Economy conducted by the Committee of Technical Instruction for the county, in the current or the previous session.

2. The scholars will be selected by the Department from the students nominated by County Committees of Technical Instruction. Each nomination must be accompanied by a report of the Domestic Economy Instructress upon the work of the applicant at the course of instruction attended.

3. Applicants for these Scholarships may be nominated for admission to the School on the 1st February or the 16th August. Nominations should be forwarded by County Committees so as to reach the Offices of the Department or on before the 1st of January or the 16th July.

4. The Scholarships will be tenable for the full course of training, which extends over about forty-six weeks.

5. A fee of £8, being one-half of the usual fee, will be payable by the County Committee in respect of each applicant nominated by them who is awarded a Scholarship, and the parent or guardian of the scholar will be required to pay the entrance fee of £1.

6. Scholars will be required to conform to all the conditions set forth in the School Programme.

7. The Department reserve the right to determine a Scholarship without notice upon being satisfied that its continuance is for any reason undesirable.

8. The decision of the Department in all questions arising in connection with the Scholarships shall be final.

FORM S. 2.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

METROPOLITAN SCHOOL OF ART, DUBLIN.

TEACHERSHIPS-IN-TRAINING, 1915.

The Department will offer for competition, in 1915, three Teacherships-in-Training tenable at the Metropolitan School of Art, Dublin. One will be open to competition amongst male candidates only, and one amongst female candidates only; the third will be open to competition amongst both male and female candidates.

The object of the Teacherships-in-Training is to encourage capable Art students to undertake such a course of training as will enable them to become Art Teachers.

The Teacherships-in-Training will entitle the holders to free admission to all the day and evening classes of the Metropolitan School of Art for the Session 1915-16; a maintenance allowance of 21*s.* per week during the Session (about forty weeks); and third-class railway fare for one journey to and from Dublin.

The basis of the awards will consist of an examination in Art subjects and specimens of work submitted according to the conditions stated below. Previous successes in respect of Art teaching qualifications will also be taken into account.

The examination will be held at the Metropolitan School of Art, Dublin, on Tuesday, Wednesday, and Thursday, the 22nd, 23rd, and 24th June, 1915.

Candidates must themselves bear any expenses incurred by them in connection with attendance at the examination.

Candidates who have held Scholarships at the Metropolitan School of Art extending over more than one School Session will not be eligible for the award of Teacherships-in-Training.

Teacherships will not be awarded to candidates who do not show in the course of the examination that they are capable of taking full advantage of the instruction provided at the Metropolitan School of Art, and, in particular, candidates with physical defects of voice, sight, or hearing, will not be regarded as eligible.

The awards will be made on the following conditions:—

(1.) Candidates must be not less than eighteen and not more than thirty years of age on the 1st September, 1915. The Department may allow a modification of this rule in special cases.

(2.) Successful candidates will be required to furnish a medical certificate of health, an authenticated copy of certificate of birth, and satisfactory testimonials from two responsible persons.

(3.) Candidates must satisfy the Department that they have had a good general education.

(4.) Candidates must have been born in Ireland, or have been resident in Ireland for three years prior to the 1st September, 1915.

(5.) Successful candidates will be required to prepare, in conjunction with the Headmaster of the School, a scheme of study, and to submit it for the Department's approval. They will be required to devote their whole time to the work of this scheme; to attend regularly and punctually; and generally to comply with

the regulations set out in the programme of the Metropolitan School of Art. They must be prepared, if required, as part of their training, to undertake such teaching work as the Headmaster may prescribe.

(6.) The Teacherships may be renewed for the second Session. Renewal will depend upon the ability and application shown by the student during the previous Session, and on the scheme of study proposed by the student when applying for renewal.

(7.) The Department reserve the right at any time to determine, without notice, any Teachership upon being satisfied that its continuance is for any reason undesirable.

(8.) The decision of the Department in all questions arising in connection with the Teacherships shall be final.

(9.) The Department do not undertake to employ the Teachers, nor to find employment for them, at the close of the period of training.

Applications for admission to the competition must be forwarded, on Form S. 3, so as to reach the offices of the Department not later than the 30th April, 1915. Applications for forms are not regarded as applications for admission to the examination. Only those candidates who present an official card of admission will be admitted to the examination room.

Copies of Form S. 3 may be obtained upon application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin, or to the Registrar, Metropolitan School of Art, Kildare Street, Dublin.

I.—Subjects of Examination.

The subjects and time-table of the examination will be as follows :—

First Day, Tuesday, June 22nd—

10 a.m. to 2 p.m.—Drawing a figure from the Antique. Drawings must be executed with the point on a half Imperial sheet of paper.

3 to 5.30 p.m.—Object Drawing. Drawings must be executed with the point and may be treated with colour.

Second Day, Wednesday, June 23rd—

10 a.m. to 1 p.m.—A measured drawing of an example of an enriched and moulded woodwork, or of a piece of furniture, with sections and full size details.

2 to 6 p.m.—Drawing Design or Modelling Design. The design must be suitable for execution in material, and, if modelled, for reproduction by casting, chasing, or carving.

Third Day, Thursday, June 24th—

10 a.m. to 1 p.m.—The Elements of Architecture. The examination will be confined to the origin and development of Architecture through constructional requirements and materials. The use of the column, lintel, arch, dome, and vaulting, with illustrations of, and with reference to, historical examples.

2 to 4 p.m.—History of Art, with special reference to the craft for which the exercise in Design has been prepared.

4.15 to 5 p.m.—Drawing on the Blackboard, in a manner suitable for class demonstration.

II.—Specimens of Work.

Each candidate must submit four specimens of work of the following descriptions :—

1. Object Drawing. The drawing may be of an interior or exterior view of a building, or may be of a similar character to that proposed for the Art Teacher's Certificate (see Form S. 240 and Programme of Technical School Examinations).
2. A Design for execution in material. Where the design has been executed by the candidate and evolved in the process, the actual specimen should be submitted and need not necessarily be accompanied by a drawing.
3. A series of studies from natural forms. (*Not less than six, and not more than twelve, drawings, unmounted, may be submitted.*)
4. A series of studies of examples of traditional ornament, from Museum examples, books or photographs. (*Not less than six, and not more than twelve, drawings, unmounted, may be submitted.*)

Note.—Specimens of work to be submitted for the competition must be delivered at the Metropolitan School of Art, Dublin, on or before Saturday, the 19th June, 1915. They should be addressed, " The Registrar, Metropolitan School of Art, Dublin," and should be specially marked " Teacherships-in-Training."

Form S. 33,

Department of Agriculture and
Technical Instruction for Ireland,
Upper Merrion Street, Dublin.

ROYAL COLLEGE OF SCIENCE, DUBLIN.

SCIENCE AND TECHNOLOGICAL SCHOLARSHIPS, AND TEACHERSHIPS-IN-TRAINING, 1915.

A limited number of Scholarships and of Teacherships-in-Training, tenable at the Royal College of Science, Dublin, will be offered for competition among Students of Science and Technology in 1915.

The Scholarships are of the value of £50 per annum, and, in addition, entitle the holder to free instruction during the Associate Course, and third-class railway fare for one journey each session to and from Dublin.

A Teachership-in-Training entitles the holder to free instruction during the Associate Course, a maintenance allowance of 21*s.* per week for the session of about forty weeks each year, and third-class railway fare for one journey each session to and from Dublin.

The Associate Course extends over four years, and the College session lasts from the beginning of October to the end of June each year.

Candidates awarded Teacherships-in-Training will be required to enter into an undertaking that they will pursue the full Associate Course, with a view to becoming Teachers of Science in Ireland, and

that, in the event of their leaving the College before obtaining the Diploma of Associateship, they will refund to the Department the sums paid to them as maintenance allowance and expenses of travelling.

Holders of Scholarships and Teacherships-in-Training will be required to devote their whole time to the work of the Associate Course, to comply with the regulations of the College, and to pass the examinations required for the Associateship. The continuance of the Scholarship or Teachership-in-Training from session to session will depend upon the ability and application which the student has shown during the previous session or sessions at the College.

Holders of Scholarships and Teacherships-in-Training who may seek leave of absence from attendance at the College in order to attend examinations for Scholarships in other Institutions, will be required to pay first the College Fee for the current term.

Candidates for Scholarships and Teacherships-in-Training must be not less than sixteen nor more than thirty years of age on the 1st June, 1915. Holders of Royal Scholarships (or, under former regulations, Royal Exhibitions or National Scholarships) awarded by the Board of Education, London, and present or past students of the Royal College of Science, are ineligible as candidates.

Candidates must have been born in Ireland, or have been resident in Ireland for three years immediately prior to the 1st June, 1915.

Candidates will have to satisfy the Department as to their knowledge of English and of one other language (Greek, Latin, Irish, French, or German). In these subjects a pass in the Senior Grade of the Intermediate Education Board's Examinations, or the equivalent of this, will be accepted as satisfactory. Those candidates who cannot thus satisfy the Department as to their knowledge of the qualifying subjects will be examined on the Syllabuses prescribed for the Entrance Examination to the Royal College of Science.

The *competition* will be confined to Mathematics, Experimental Science, and Drawing.

The Syllabus in Mathematics will be the *Honours* Courses in Arithmetic with Algebra, Geometry, and Trigonometry for the Senior Grade of the Intermediate Education Board's Examinations of 1915.

In Experimental Science, candidates will be allowed the choice of one of the following subjects of the Special Courses of Experimental Science of the Department's Programme for Day Secondary Schools:—Physics, Chemistry, Mechanics, Botany, Physiology and Hygiene, Physical and Commercial Geography. The papers set may, however, include questions on the work of the Two Year Preliminary Course.

The Syllabus in Drawing will be the First and Second Year Syllabuses of the Programme for Day Secondary Schools.

NOTE.—Text Books, other than those referred to in the Syllabuses, are not prescribed for the examinations.

The examination will be held in Dublin on the days and at the hours shown below:—

Tuesday, 29th June.—Greek, Latin, Irish, French or German, 2 p.m. to 5 p.m.

Wednesday, 30th June.—Mathematics (First Paper), 10 a.m. to 1 p.m.; Experimental Science (Written Examination), 2 p.m. to 5 p.m.

Thursday, 1st July.—Mathematics (Second Paper), 10 a.m. to 1 p.m.; Experimental Science (Practical Examination), 2 p.m. to 5 p.m.

Friday, 2nd July.—Drawing, 10 a.m. to 1.10 p.m.; English, 2 p.m. to 5 p.m.

(*These dates are subject to alteration.*)

Candidates must themselves bear any expenses incurred by them in connection with attendance at the examination.

Scholarships or Teacherships-in-Training will not be awarded to candidates who do not show in the course of the examination that they are capable of taking full advantage of the instruction provided at the Royal College of Science. Candidates with physical defects of voice, sight, or hearing, will not be regarded as eligible for Teacherships-in-Training.

Successful candidates will be required to furnish a Medical Certificate of Health, an authenticated copy of Certificate of Birth, and satisfactory testimonials from two responsible persons.

The Department reserve the right at any time to determine without notice a Scholarship or Teachership-in-Training, upon being satisfied that its continuance is for any reason undesirable.

The decision of the Department in all questions arising in connection with the Scholarships and Teacherships-in-Training shall be final.

The Department do not undertake to employ Teachers, nor to find employment for them, at the close of the period of training.

Applications for admission to the examination must be made not later than the 29th April, on Form S. 34, copies of which may be obtained upon application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin, or to the Registrar, Royal College of Science, Upper Merrion Street, Dublin.

Applications received after the 30th April will be too late for consideration. Applications for forms are not regarded as applications for admission to the examination. Only those candidates who present an official card of admission will be permitted to attend the examination.

FORM S. 255.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

EXAMINATION IN THE PRINCIPLES, METHODS, AND HISTORY OF EDUCATION, 1915.

An examination in the Principles, Methods, and History of Education, with special reference to Science Teaching, will be held on Saturday, the 26th June, 1915. The examination will be held in Dublin, and also, if a sufficient number of applications are received, in Belfast and Cork.

The test in this subject is provided for persons who have been provisionally recognised as Teachers of Experimental Science under the conditions of §§ I. (1) and II. (1) of the Department's Circular Letter (No. 23) of May, 1903, and the Department will not be prepared to admit applicants who are not qualified for such provisional recognition.

Applications for admission to the examination should be submitted not later than the 31st May, on Form S. 250, copies of which may be obtained after the 1st February from the offices of the Department.

A fee will not be charged for admission to the examination.

SYLLABUS OF EXAMINATION.

The history and criticism of opinion upon the Ends of Education and of the Curriculum as the means of attaining those ends, with special reference to the development and present state of instruction in Science.

The Endowment of the child as the basis of the educational process. The relation of Development to Endowment.

The main features of general development; the inter-relation of the Intellectual, Emotional and Active factors.

The chief stages in general development: their characteristics and normal order of appearance.

The most important differences between individual children with regard to the foregoing.

The general characteristics of the Curriculum and Methods of instruction in Science as determined by the laws of general development: the correlation of Science with other subjects of the Curriculum.

The nature and relations of the mental functions involved in the acquisition of Knowledge. Individual differences with regard to these, especially in the characteristics of Attention and Imagery. The main principles of Exposition.

The general nature of the Inductive and Deductive processes: their relations to one another in the development of knowledge: their characteristics at different stages of general development.

The methodology of instruction in Science as determined by the laws of development of Knowledge: the functions and relations of laboratory work and class teaching.

The critical study of the history of a special branch of Science so far as it bears upon the teaching of the subject.

The general principles of Class-management: Order and Discipline: class-management in the laboratory.

The use of note-books and text-books in Science teaching: methods of recording and treating observational data. Correlation of Science teaching with instruction in English and Drawing.

The construction and use of pictorial illustrations, diagrams and models: the construction of apparatus.

Supplementary means of instruction: records of daily or seasonal observations, the school excursion, school gardens and museums.

Laboratory organisation and management.

The following books may be consulted :—

Raymont: "The Principles of Education." (Longmans, Green & Co.)

Monroe: "A Brief Course in the History of Education." (Macmillan & Co.)

McDougall: "Psychology." (*Home University Library*. Williams & Norgate.)

Thomson: "Introduction to Science." (*Home University Library*. Williams & Norgate.)

Westaway: "Scientific Method." Books II., III., and IV. (Blackie & Sons.)

Armstrong: "The Teaching of Scientific Method." (Macmillan & Co.)

One of the three following :—

Dumville: "Fundamentals of Pyschology." (Clive & Co.)

Green & Loveday: "Introduction to Pyschology." (Clarendon Press.)

Welton: "Psychology of Education." (Macmillan & Co.)

One or more of the three following :—

Adams: "The Herbartian Psychology applied to Education." (D. C. Heath & Co.)

Adams: "Exposition and Illustration in Teaching." (Macmillan & Co.)

Adamson: "The Practice of Instruction." Part I. (National Society's Depository.)

One or more of the following :—

Adamson: "The Practice of Instruction." Part II., Section VI. (National Society's Depository.)

Mann: "The Teaching of Physics." (Macmillan & Co.)

Perry: "The Teaching of Mechanics." (Macmillan & Co.)

Rennie: "Lessons in Plant and Animal Life." (Clive & Co.)

Smith & Holl: "The Teaching of Chemistry and Physics in the Secondary School." (Longmans, Green & Co.)

Various Articles in "The Teacher's Encyclopædia." (Caxton Publishing Co.)

One or more of the following :—

Cajori: "History of Physics." (Macmillan & Co.)

Mach: "The Science of Mechanics." (Kegan Paul & Co.)

Thomson: "The Science of Life." (Blackie & Co.)

Thorpe: "Essays in Historical Chemistry." (Macmillan & Co.)

The Alembic Club Reprints. (Simpkin, Marshall & Co.)

NOTES AND MEMORANDA.

Meeting of the Agricultural Board.

A meeting of the Agricultural Board was held at the Offices of the Department, Upper Merrion Street, on Tuesday, 23rd March, 1915. The following were present:—The Right Hon. T. W. Russell, M.P., Vice-President of the Department (in the Chair); Mr. Alexander L. Clark, J.P.; Alderman Henry Dale, J.P.; Very Rev. Canon Daly, D.D., P.P.; Mr. Robert Downes; Col. Sir Nugent T. Everard, Bart., H.M.L.; Sir Josslyn Gore-Booth, Bart., D.L.; Most Rev. Denis Kelly, D.D., Lord Bishop of Ross; Mr. George Murnaghan, J.P.; Mr. David L. O'Gorman, J.P.; and Mr. P. J. O'Neill, J.P.

Mr. T. P. Gill, Secretary of the Department; Mr. J. R. Campbell, B.SC., Assistant Secretary in respect of Agriculture; Mr. J. S. Gordon, B.SC., Deputy Assistant Secretary and Chief Agricultural Inspector; Mr. H. G. Smith, LL.D., Chief Clerk; Mr. T. Butler, Superintendent of the Statistics and Intelligence Branch; Mr. J. P. Walsh, Clerk in Charge of Accounts; Mr. J. V. Coyle, B.L. (who acted as Secretary to the meeting); and Mr. F. J. Meyrick, M.A., were also present.

On the motion of the Most Rev. Denis Kelly, D.D., Lord Bishop of Ross, seconded by Mr. Patrick J. O'Neill, J.P., a resolution of sympathy with the relatives of the late Mr. J. D. Daly, M.A., B.L., who at the time of his death was Chief Clerk to the Department, and who had for many years acted as Secretary to the Board, was adopted.

The Board had under consideration the serious effect of the war on the Department's finances.

The Board also gave special consideration to the prospects of the agricultural population in relation to the war, and deemed it advisable to publish the following statement:—

After Effects of the War—Warning to Farmers.

In periods of prosperity there is, generally, an undue expansion of the credit system followed by much hardship when depression comes. Within our own experience we have seen many instances, but the most widespread and historic was in the period 1870 to 1880. There were six or seven years of abounding prosperity; shopkeepers sold freely on credit, banks and moneylenders lent money unstintedly; the people adopted an expensive style of living and went deeply into debt. The bad year 1878 was followed by a year, 1879, in which the harvest was almost a complete failure, and, at the same time, cattle became practically unsaleable. The outcome was a period of widespread and grievous loss and suffering.

Recently, with some special checks, notably the outbreaks of foot-and-mouth disease, there has been a succession of good years and an increasing prosperity, culminating in the present high war prices of all agricultural produce.

All great wars have been followed by years of shrinkage and distress. We would refer as an instance to the condition of Great Britain and Ireland after the close of the Napoleonic Wars, from 1816 to 1825. In 1817 the poverty of Ireland necessitated the passing of an Act of Parliament amalgamating the Exchequers of Great Britain and Ireland which had remained separate and independent for seventeen years after the Act of Union. We also would refer to the history of France in 1796 and to the history of Prussia during the Seven Years' War under Frederick the Great. The South African War, compared with the present European crisis, was a petty campaign against a population of less than half a million; no peoples were involved except the British and the Boers. Yet the years which followed it, 1904, 1905, and 1906, were years of depression.

The Board therefore desire to impress on the agricultural community that the present high prices will, by an inevitable law, be followed at the close of the War by a period of low prices, depression and, perhaps, distress. Accordingly we venture strongly to advise them to clear off or reduce as far as possible all old debts; to refrain from borrowing or dealing in credit except for the purpose of increasing the produce of their farms; and to make every effort to save a little money in order to help to tide over the time of depression. We may also point out that, even from the low standpoint of the pecuniary advantage of Irish agriculture, the shorter the war the better; for the longer the war continues the longer and more acute will be the subsequent period of depression.

Meeting of the Board of Technical Instruction.

A meeting of the Board of Technical Instruction was held at the Offices of the Department, Upper Merrion Street, on Tuesday, the 30th March, 1915. The following were present:—Mr. T. P. Gill, Secretary of the Department (in the Chair); Mr. Christopher J. Dunne, J.P.; Rev. Henry Evans, D.D., M.R.I.A., F.I.H.; Rev. T. A. Finlay, M.A.; Mr. Wm. Macartney, J.P.; Alderman S. T. Mercier, J.P.; the Most Rev. Richard A. Sheehan, D.D., Lord Bishop of Waterford and Lismore; Mr. Richard Sisk, Mr. Alex. Taylor, and Mr. William Wallace, J.P.

Mr. George Fletcher, Assistant Secretary in respect of Technical Instruction; Mr. H. G. Smith, Chief Clerk; Mr. T. Butler, Superintendent of the Statistics and Intelligence Branch; Mr. W. Vickers Dixon, Senior Inspecctor of Technical Instruction; Mr. A. Kelly, and Mr. J. V. Coyle (who acted as Secretary of the meeting), were also present.

The Board had under consideration the triennial division of the Endowment fund for technical instruction as provided by Section 16 (1) (c) of the Agriculture and Technical Instruction (Ireland) Act, 1899.

The Board also considered the effect of the war on the Department's finances.

Technical Instruction Schemes in respect of the Session 1914-15 for the Urban District of Kingstown and County Kerry were considered and approved, and the Board concurred in the allocation of grants in aid thereof from the funds of the Department.

Advisory Committees.

The twenty-sixth meeting of the Committee on the Breeding of Live Stock (exclusive of Horses) was held at the offices of the Department, 4 Upper Merrion St., Dublin, on Thursday, 28th January, 1915, at 3 p.m.

Present :—The Right Hon. T. W. Russell, M.P., P.C., Vice-President of the Department (in the Chair); Messrs. R. A. Anderson, R. N. Boyd, J.P.; Robert Downes, J.P.; Colonel Sir Nugent T. Everard, H.M.L.; Mr. William Field, M.P.; Mr. T. P. Gill, Secretary of the Department, and Mr. J. R. Campbell, Assistant Secretary in respect of Agriculture.

Mr. D. S. Prentice, Chief Inspector, Veterinary Branch, was present.

Mr. Joseph O'Connor, Naas, was also present, by invitation of the Department.

Mr. F. J. Meyrick acted as Secretary to the meeting.

The minutes of the previous meeting having been circulated, were taken as read and signed.

The Committee had under consideration the question of the exportation of in-calf cows and heifers to Great Britain, and the alleged undue slaughter of this class of stock since the outbreak of war. A report on the subject from the military authorities at Belfast was discussed and recommendations made as to the action to be taken thereon by the Department.

The Committee adjourned at 4.30 p.m.

The Advisory Committee on Flax held its Nineteenth Meeting at the Central Hall, Rosemary Street, Belfast, on Thursday, the 1st April, 1915, at 1.30 p.m.

Present :—Messrs. J. R. Campbell, Assistant Secretary in respect of Agriculture (in the Chair); F. Barbour, H. Barbour, M.A.; A. L. Clark, J.P.; A. T. Clarke, R.D.C.; J. G. Crawford, P. Kelly, Jas. Stewart, John M. Stewart.

Messrs. J. S. Gordon, Deputy Assistant Secretary in respect of Agriculture; J. H. Hinchcliff, and W. J. Megaw, were also present.

Mr. F. J. Meyrick acted as Secretary to the meeting.

The minutes of last meeting, which had been circulated, were taken as read, and were accordingly signed.

The report on the Flax Schemes for 1914-15 was discussed. Proposals for the carrying on of the work during 1915-16 were considered and approved.

STATISTICAL

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned
compared with the

Kinds of Fish.	North Coast. *(Erris Head to Torr Head.)				East Coast. (Torr Head to Carnsore Point.)			
	1915.		1914.		1915		1914.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, ...	—	—	—	—	16	71	10	27
Soles, ...	1	3	1	6	28	167	32	150
Turbot, ...	—	—	—	—	16	88	24	129
Total Prime Fish, .	1	3	1	6	60	326	66	306
Cod, ...	286	221	3,450	2,052	830	1,112	709	562
Conger Eel, . . .	14	13	5	2	133	130	95	89
Haddock, ...	158	147	317	264	43	45	109	107
Hake, ...	—	—	—	—	29	51	69	104
Herrings, ...	1,250	668	32,512	8,928	6,009	2,556	7,930	2,866
Ling, ...	—	—	97	50	24	18	78	79
Mackerel, ...	1,015	428	3,858	579	—	—	—	—
Plaice, ...	10	10	54	43	423	878	321	376
Ray or Skate, . .	155	48	478	116	195	140	118	113
Sprats, ...	—	—	—	—	—	—	—	—
Whiting, ...	43	31	124	61	566	593	2,944	253
All other except Shell Fish	12	9	212	80	367	345	263	228
Total, . .	2,944	1,578	41,108	12,181	8,679	6,194	12,699	5,083
SHELL FISH :—	No.		No.		No.		No.	
Crabs, . . .	—	—	396	1	—	—	—	—
Lobsters, . .	688	20	1,236	52	1,785	84	2,648	159
	Cwt.		Cwt.		Cwt.		Cwt.	
Mussels, . .	120	10	180	14	165	29	—	—
	No.		No.		No.		No.	
Oysters, . .	—	—	—	—	—	—	—	—
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish, .	20	3	121	16	24	14	92	22
Total, . .	—	33	—	83	—	127	—	181
Total value of Fish landed	—	1,611	—	12,264	—	6,321	—	5,264

NOTE.—The above figures are subject

* In monthly returns previous to and including December, 1914, the extent of each
Torr Head; East Coast—Torr Head to Carnsore Point; South Coast—

TABLES.

IRELAND.

as landed on the Irish Coasts during the month of January, 1915, as
corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
17	40	7	15	—	—	—	—	33	111	17	42
25	139	20	87	15	55	37	115	69	364	90	358
3	17	3	14	8	35	18	87	27	140	45	230
45	196	30	116	23	90	55	202	129	615	152	630
13	20	14	17	123	52	192	103	1,252	1,405	4,365	2,734
—	—	—	—	93	46	76	31	240	189	176	122
—	—	5	6	33	33	178	126	234	225	609	503
—	—	—	—	—	—	—	—	29	51	69	104
8,637	4,106	1,367	614	229	86	176	56	16,125	7,416	41,985	12,464
1	1	—	—	77	53	62	44	102	72	234	173
519	383	24,350	6,821	—	—	1,044	349	1,534	811	29,252	7,749
112	160	111	117	36	29	76	74	581	1,077	562	610
69	15	41	6	36	8	44	9	455	211	681	244
38	10	77	16	—	—	—	—	38	10	77	16
1	1	8	3	30	28	173	67	640	653	3,249	384
135	64	108	41	33	22	39	49	547	440	622	398
9,570	4,956	26,111	7,757	713	447	2,115	1,110	21,906	13,175	82,033	26,131
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	—	—	396	1
—	—	—	—	—	—	—	—	2,473	104	3 884	211
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
1,095	164	1,851	253	160	12	—	—	1,540	215	2,031	267
No.		No.		No.		No.		No.		No.	
18,648	37	53,928	68	16,680	35	15,840	33	35,328	72	69,768	101
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
450	144	633	204	832	158	562	115	1,326	319	1,408	357
—	345	—	525	—	205	—	148	—	710	—	937
—	5,301	—	8,282	—	652	—	1,258	—	13,885	—	27,068

to correction in Annual Returns.
of the Coasts referred to therein was as follows :—North Coast—Rossan Point to
Carnsore Point to Kenmare ; West Coast—Kenmare to Rossan Point.

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned
compared with the

Kinds of Fish.	North Coast. * (Erris Head to Torr Head.)				East Coast. (Torr Head to Carnsore Point)			
	1915.		1914.		1915.		1914.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, ...	—	—	—	—	8	41	45	118
Soles, ...	—	—	—	—	10	74	29	136
Turbot, ...	—	—	—	—	9	53	22	95
Total Prime Fish, .	—	—	—	—	27	168	96	349
Cod, ...	583	603	1,492	941	899	1,066	1,036	1,077
Conger Eel, . . .	9	14	102	30	85	81	270	225
Haddock, . . .	180	173	125	92	41	45	200	188
Hake, ...	—	—	—	—	41	67	293	384
Herrings, ...	5,182	2,354	55,356	9,174	1,435	622	4,066	1,478
Ling, ...	3	4	34	15	48	36	344	324
Mackerel, ...	47	21	2,038	715	—	—	26	16
Plaice, ...	9	10	37	35	330	675	217	311
Ray or Skate, . .	305	130	292	90	132	117	253	209
Sprats, ...	—	—	—	—	—	—	—	—
Whiting, ...	51	38	33	18	385	465	492	334
All other except Shell Fish	116	30	447	159	360	319	282	240
Total, . .	6,485	3,377	59,956	11,269	3,783	3,691	7,584	5,135
SHELL FISH :— . .	No.		No.		No.		No.	
Crabs, . . .	—	—	1,008	2	—	—	—	—
Lobsters, . .	652	17	744	35	1,007	43	975	70
	Cwt.		Cwt.		Cwt.		Cwt.	
Mussels, . .	—	—	190	17	150	26	—	—
	No.		No.		No.		No.	
Oysters, . .	—	—	—	—	—	—	1,638	3
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish, .	20	3	91	12	18	10	198	67
Total, . .	—	20	—	66	—	79	—	140
Total value of Fish landed	—	3,397	—	11,335	—	3,770	—	5,275

NOTE.—The above figures are subject

* In monthly returns previous to and including December, 1914, the extent of each
Head; East Coast—Torr Head to Carnsore Point; South Coast—

IRELAND.

as landed on the Irish Coasts during the month of February, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
9	19	3	5	—	—	—	—	17	60	48	123
32	180	17	74	14	61	30	121	56	315	76	331
3	12	1	5	11	44	14	70	23	109	37	170
44	211	21	84	25	105	44	191	96	484	161	624
8	12	7	6	233	139	232	143	1,723	1,820	2,767	2,167
—	—	—	—	62	34	17	4	156	129	349	259
—	—	—	—	83	108	132	119	304	326	466	399
—	—	—	—	—	—	—	—	41	67	293	384
209	97	183	71	—	—	—	—	6,826	3,073	59,605	10,723
15	14	—	—	131	141	46	49	197	195	424	388
1,250	585	720	346	621	367	113	45	1,918	973	2,897	1,422
134	131	48	46	28	26	71	68	501	842	373	460
44	10	10	2	54	14	19	6	535	271	574	307
—	—	—	—	—	—	—	—	—	—	—	—
—	—	7	2	23	7	91	57	459	540	686	411
91	48	68	42	18	24	95	68	585	421	892	509
1,795	1,108	1,064	599	1,278	965	863	750	13,341	9,141	69.467	17.753
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	—	—	1,008	2
—	—	—	—	—	—	—	—	1,659	60	1,719	105
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
582	58	1,420	176	—	—	—	—	732	84	1,610	193
No.		No.		No.		No.		No.		No.	
11,442	25	20,034	33	8,280	17	10,320	22	19,722	42	31,992	58
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
318	63	525	140	658	158	429	83	1,014	234	1,243	302
—	146	—	349	—	175	—	105	—	420	—	660
—	1,254	—	948	—	1,140	—	855	—	9,561	—	18,413

to correction in Annual Returns.

of the Coasts referred to therein was as follows : North Coast—Rossan Point to Torr Carnsore Point to Kenmare ; West Coast—Kenmare to Rossan Point.

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast; *(Erris Head to Torr Head).				East Coast. (Torr Head to Carnsore Point).			
	1915.		1914.		1915.		1914.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill,	—	—	—	—	3	9	38	91
Soles,	—	—	—	—	5	31	23	103
Turbot,	—	—	—	—	5	24	34	161
Total Prime Fish,	—	—	—	—	13	64	95	355
Cod,	576	393	271	214	2,354	1,866	1,551	1.324
Conger Eel,	40	56	176	124	78	57	612	520
Haddock,	167	132	25	18	30	32	589	528
Hake,	—	—	—	—	93	139	504	557
Herrings,	13,211	4,876	2,034	705	804	187	187	74
Ling,	—	—	14	11	6	3	561	524
Mackerel,	59	32	106	52	—	—	—	—
Plaice,	88	98	160	153	280	396	434	760
Ray or Skate,	309	103	181	65	106	59	408	338
Sprats,	—	—	—	—	—	—	—	—
Whiting,	4	3	108	65	475	447	966	750
All other except Shell Fish	443	180	137	40	311	191	310	283
Total,	14,897	5,873	3,212	1,447	4,550	3,441	6.217	6,013
SHELL FISH :—	No.		No.		No.		No.	
Crabs,	198	1	828	5	—	—	—	—
Lobsters,	314	10	954	36	2,065	109	1,040	83
	Cwt.		Cwt.		Cwt.		Cwt	
Mussels,	—	—	80	7	132	23	362	89
	No.		No.		No.		No.	
Oysters,	—	—	—	—	3,150	4	17,514	23
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish,	30	5	124	16	72	24	449	121
Total,	—	16	—	64	—	160	—	316
Total value of Fish landed	—	5,889	—	1,511	—	3,601	—	6,329

NOTE.—The above figures are subject

*In monthly returns previous to and including December, 1914, the extent of each of the Coast—Torr Head to Carnsore Point; South Coast—Carnsore

IRELAND.

as Landed on the Irish Coasts during the month of March, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head).				West Coast. (Loop Head to Erris Head).				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
24	49	21	42	—	—	—	—	27	58	59	133
164	865	129	630	11	40	14	47	180	936	166	780
11	48	6	30	11	46	10	48	27	118	50	239
199	962	156	702	22	86	24	95	234	1,112	275	1,152
20	29	53	49	511	331	395	153	3,461	2,619	2,270	1,740
—	—	—	—	170	85	27	11	288	198	815	655
—	—	—	—	153	154	213	158	350	318	827	704
—	—	—	—	3	1	—	—	96	140	504	557
14	7	—	—	113	35	5	2	14,142	5,105	2,226	781
31	27	—	—	186	178	35	33	223	208	610	568
2,089	1,089	565	299	14	7	20	6	2,162	1,128	691	357
269	259	343	295	38	42	61	58	675	795	998	1,266
177	54	176	20	81	21	24	5	673	237	789	428
—	—	—	—	—	—	—	—	—	—	—	—
1	1	11	3	10	5	20	8	490	456	1,105	826
212	158	228	66	49	42	16	14	1,015	571	691	403
3,012	2,586	1,532	1,434	1,350	987	840	543	23,809	12,887	11,801	9,437
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	198	1	828	5
60	3	—	—	18	1	—	—	2,457	123	1,994	119
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
207	31	470	70	—	—	—	—	339	54	912	166
No.		No.		No.		No.		No.		No.	
7,434	15	5 040	10	9,960	21	6,720	14	20,544	40	29 274	47
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
264	60	556	118	739	208	347	73	1,105	297	1,476	328
—	109	—	198	—	230	—	87	—	515	—	665
—	2,695	—	1,632	—	1,217	—	630	—	13,402	—	10,102

to correction in Annual Returns.

Coasts referred to therein was as follows :—North Coast—Rossan Point to Torr Head ; East Point to Kenmare ; West Coast—Kenmare to Rossan Point.

Statement of the Total Quantity of Fish landed on the English and Welsh Coasts during the Month and Three Months ended 31st March, 1915, compared with the corresponding periods of the Year 1914.

Kinds of Fish.	March		Three months ended 31st March.	
	1915.	1914.	1915.	1914.
	Quantity.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill,	758	1,840	2,464	5,833
Soles,	3,236	6,[illegible]41	8,773	19,721
Turbot,	2,717	6,269	7,202	20,254
Prime Fish not separately distinguished,	—	49	—	119
Total Prime Fish,	6,711	14,399	18,439	45,927
Bream,	3,838	6,094	12,482	17,158
Catfish,	3,444	10,543	6,951	18,478
Coalfish,	30,527	71,250	56,468	123,645
Cod,	206,389	280,996	473,586	717,214
Conger Eels,	5,187	4,071	12,244	13,592
Dabs,	8,301	12,856	22,975	33,767
Dogfish,	2,032	2,038	11,069	11,732
Dory,	37	162	98	350
Flounders or Flukes,	580	909	985	2,435
Gurnards,	6,885	11,775	12,499	25,811
Haddock,	80,161	87,844	220,924	242,142
Hake,	16,222	39,083	42,302	89,148
Halibut,	1,873	5,729	4,428	13,401
Latchets (Tubs),	17	3[illegible]4	111	972
Lemon Soles,	2,104	4,260	4,476	9,122
Ling,	7,238	22,572	12,636	47,597
Megrims,	2,445	5,843	4,710	14,501
Monks (or Anglers),	1,978	3,001	5,507	9,416
Mullet (Red),	5	14	5	52
Plaice,	25,933	54,7[illegible]5	65,185	160,540
Pollack	6,373	2,645	8,115	4,496
Skates and Rays,	19,[illegible]33	29,466	49,929	91,151
Torsk,	886	2,125	1,925	4,618
Whiting,	22,633	46,006	62,754	152,844
Witches,	506	4,130	1,160	10,103
Herrings,	136	1,409	8,752	25,829
Mackerel,	53,977	16,188	70,327	20,052
Mullet (Grey)	236	23	386	170
Pilchards,	—	—	—	148
Sprats,	2,073	98	49,459	49,108
Whitebait,	359	353	1,001	1,153
Fish not separately distinguished,	19,975	41,991	45,809	104,992
Total Wet Fish,	538,497	782,932	1,287,697	2,061,664
Shell Fish :—	No.	No.	No.	No.
Crabs,	231,338	694,862	341,575	1,046,454
Crawfish (Crayfish)	93	476	269	790
Lobsters,	18,032	36,860	25,584	62,488
Oysters,	3,573,508	2,364,253	9,885,820	8,342,986
	Cwt.	Cwt.	Cwt.	Cwt.
Other Shell Fish,	40,311	46,982	135,729	164,023

Note.—The figures for 1915 are subject to revision.

Statement of the Total Value of Fish landed on the English and Welsh Coasts during the Month and Three Months ended 31st March, 1915, compared with the corresponding periods of the Year 1914.

Kinds of Fish.	March 1915.	March 1914.	Three months ended 31st March. 1915.	Three months ended 31st March. 1914.
	Value.			
	£	£	£	£
Brill,	**3,081**	6,031	**10,149**	18,732
Soles,	**25,761**	42,500	**65,129**	122,071
Turbot,	**11,646**	26,023	**33,326**	87,128
Prime Fish not separately distinguished,	—	82	—	194
Total Prime Fish,	**40,488**	74,636	**108,604**	228,125
Bream,	**3,111**	3,168	**10,117**	9,053
Catfish,	**2,740**	5,851	**5,792**	10,400
Coalfish,	**16,040**	18,928	**31,855**	37,765
Cod,	**194,260**	180,284	**499,694**	513,677
Conger Eels,	**5,084**	3,099	**12,356**	10,502
Dabs,	**14,807**	13,019	**46,989**	35,094
Dogfish,	**928**	763	**6,321**	4,314
Dory,	**58**	182	**148**	401
Flounders or Flukes,	**534**	664	**912**	1,618
Gurnards,	**3,197**	3,842	**6,209**	8,915
Haddock,	**114,728**	92,125	**306,295**	270,426
Hake,	**27,445**	49,157	**74,265**	121,029
Halibut,	**8,198**	21,072	**20,892**	53,730
Latchets (Tubs),	**12**	168	**114**	544
Lemon Soles,	**7,218**	12,962	**16,876**	30,047
Ling,	**6,196**	11,466	**11,410**	26,283
Megrims,	**3,521**	5,648	**7,154**	15,121
Monks (or Anglers),	**1,582**	2,086	**4,535**	6,503
Mullet (Red),	**22**	40	**22**	133
Plaice,	**58,913**	78,060	**154,566**	230,673
Pollack,	**4,864**	1,772	**6,788**	3,428
Skates and Rays,	**20,055**	24,163	**54,252**	75,351
Torsk,	**512**	917	**1,106**	2,447
Whiting,	**25,742**	34,862	**72,660**	112,029
Witches,	**1,265**	5,349	**3,003**	13,814
Herrings,	**88**	324	**8,023**	13,620
Mackerel,	**31,471**	11,657	**44,465**	15,025
Mullet (Grey),	**293**	55	**573**	369
Pilchards,	—	—	—	57
Sprats,	**265**	15	**9,252**	9,855
Whitebait	**584**	816	**1,603**	2,466
Fish not separately distinguished,	**16,290**	24,211	**35,319**	63,843
Total Wet Fish	**610,511**	681,361	**1,562,170**	1,926,657
Shell Fish:—				
Crabs,	**2,523**	6,190	**3,888**	9,731
Crawfish (Crayfish)	**5**	39	**13**	58
Lobsters,	**989**	2,184	**1,431**	3,715
Oysters,	**10,874**	8,172	**31,094**	29,745
Other Shell Fish,	**7,885**	9,199	**22,516**	29,204
Total Shell Fish,	**22,276**	25,784	**58,942**	72,453
Total Value	**632,787**	707,145	**1,621,112**	1,999,110

Note—The figures for 1915 are subject to revision.

Statement of the **Total Quantity** of the **Fish** landed on the **Scottish Coasts** during the Month and Three Months ended 31st March, 1915, compared with the corresponding periods of the year 1914.

Kinds of Fish.	March.		Three Months ended 31st March.	
	1915.	1914.	1915.	1914.
	Quantity			
	Cwt.	Cwt.	Cwt.	Cwt.
Herrings . . .	49,810	89,984	203,817	863,958
Sprats . . .	26	20	2,3[illegible]4	4,741
Sparlings . . .	3	26	106	102
Mackerel . . .	475	833	694	10,389
Cod and Codling . .	76,620	105,227	148,540	231,707
Ling . . .	13,279	23,481	24,362	51,178
Torsk (Tusk) . .	1,720	2.346	3,193	4,209
Saith (Coal Fish) . .	19,524	36,605	60,629	86,62[illegible]
Haddocks . . .	43,8[illegible]1	42,025	109.775	127,487
Whitings . . .	5,667	20,392	16,712	69,971
Conger Eels . . .	3,151	6,910	5,858	16,723
Gurnards . . .	364	406	887	1,[illegible]37
Catfish . . .	2,961	3,134	5,426	5,777
Monks (Anglers) . .	737	2,073	3,455	6,978
Hake . . .	1,024	1,667	2,566	3,916
Squids . . .	—	—	26	10
Turbot . . .	368	306	798	862
Halibut . . .	1,609	3,522	3,034	6,216
Lemon Soles . . .	2,354	2,193	5,824	5,011
Flounders . . .	229	370	743	1,443
Plaice . . .	3,627	4,085	8,456	10,423
Brill . . .	6	32	30	87
Dabs . . .	620	740	1,580	2,284
Witches . . .	270	1,492	868	7,121
Megrims . . .	1,039	1,767	4,474	5,[illegible]74
Skates and Rays . .	12,119	19,254	22,689	48,745
Unclassified kinds . .	369	499	842	4,249
Totals .	241,862	369,389	637,688	1,576,320
	No.	No.	No.	No.
Shell Fish :—				
Crabs . . .	69,011	293,550	190,474	569,621
Lobsters . . .	32,232	39,024	94,390	115,464
Oysters . . .	57,200	98,000	159,704	320,740
	Cwt.	Cwt.	Cwt.	Cwt.
Clams . . .	1,237	807	2,468	2,234
Mussels . . .	8,241	3,710	33,162	18,542
Unclassified . .	3,830	6,137	7,849	12,363

Note—Landed by Foreign Vessels during the Three Months ended 31st March, 1915 (not included above), nil cwt.
The above figures are subject to correction in the Annual Returns.

STATEMENT of the TOTAL VALUE of the FISH landed on the SCOTTISH COASTS during the Month and Three Months ended 31st March, 1915, compared with the corresponding periods of the year 1914.

Kinds of Fish.	March.		Three Months ended 31st March.	
	1915.	1914.	1915.	1914.
	Value			
	£	£	£	£
Herrings	13,212	18,786	81,715	193,060
Sprats	4	7	850	509
Sparlings	17	95	254	343
Mackerel	146	313	243	3,438
Cod and Codling	60,970	55,020	135,519	139,531
Ling	8,192	9,361	15,098	20,090
Torsk (Tusk)	1,308	848	2,605	1,684
Saith (Coal Fish)	8,113	7,718	22,193	19,957
Haddocks,	41,969	39,430	114,150	122,084
Whitings	5,185	14,908	16,922	46,808
Conger Eels	1,835	3,064	3,348	7,532
Gurnards	106	91	314	233
Catfish	1,392	928	2,639	2,025
Monks (Anglers)	350	725	1,697	2,242
Hake	1,787	1,865	4,868	5,101
Squids	—	—	12	1
Turbot	1,163	924	2,550	2,741
Halibut	5,327	8,831	10,217	17,272
Lemon Soles	8,607	6,123	21,622	15,546
Flounders	243	251	760	945
Plaice	6,221	6,786	15,485	17,627
Brill	13	55	71	151
Dabs	382	306	1,080	992
Witches	549	2,134	1,891	9,085
Megrims	2,714	2,612	10,642	7,359
Skates and Rays	5,730	6,789	10,735	16,973
Unclassified kinds	140	102	361	449
Totals	175,675	188,072	477,841	653,778
Shell Fish :—				
Crabs	509	1,660	1,277	3,196
Lobsters	1,721	2,640	5,262	8,019
Oysters	232	363	646	1,201
Clams	185	121	403	328
Mussels	455	218	1,739	1,051
Unclassified	1,000	1,518	1,972	3,258
Totals	4,102	6,520	11,299	17,053
Total Value of all Fish	179,777	194,592	489,140	670,831

NOTE—Landed by Foreign Vessels during the Three Months ended 31st March, 1915 (not included above), £ nil.
The above figures are subject to correction in the Annual Returns.

Statement of the **Total Quantity** and **Value** of the **Fish** returned as landed on the **Irish Coasts** during the Month and Three Months ended 31st March, 1915, compared with the corresponding periods of the Year 1914.

Kinds of Fish.	March. 1915.	March. 1914.	Three Months ended 31st March. 1915.	Three Months ended 31st March. 1914.
	Quantity.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill,	27	59	77	124
Soles,	180	166	305	332
Turbot,	27	50	77	132
Total Prime Fish,	234	275	459	588
Cod,	3,461	2,270	6,436	9,402
Conger Eel,	288	815	684	1,380
Haddock,	350	827	888	1,902
Hake,	96	504	166	866
Herrings,	14,142	2,226	37,093	103,816
Ling,	223	610	522	1,268
Mackerel,	2,162	691	5,614	32,840
Plaice,	675	998	1,757	1,933
Ray or Skate,	673	789	1,663	2,044
Sprats,	—	—	38	77
Whiting,	490	1,105	1,589	4,980
All other except Shell Fish,	1,015	691	2,147	2,205
Total,	23,809	11,801	59,056	163,301
Shell Fish :—	No.	No.	No.	No.
Crabs,	198	828	198	2,232
Lobsters,	2,457	1,994	6.589	7,597
	Cwt.	Cwt.	Cwt.	Cwt.
Mussels,	339	912	2.911	4,553
	No.	No.	No.	No.
Oysters,	20,544	29,274	75.594	131,034
	Cwt.	Cwt.	Cwt.	Cwt.
Other Shell Fish,	1,105	1,476	3,445	4,127
	Value.			
	£	£	£	£
Brill,	58	133	229	298
Soles,	936	780	1,615	1,469
Turbot,	118	239	367	639
Total Prime Fish,	1,112	1,152	2,211	2,406
Cod,	2,619	1,740	5,844	6,641
Conger Eel,	198	655	516	1,036
Haddock,	318	704	869	1,606
Hake,	140	557	258	1,045
Herrings,	5,105	781	15,594	23,968
Ling,	208	568	475	1,129
Mackerel,	1,128	357	2,912	9,228
Plaice,	795	1,266	2,714	2,336
Ray or Skate,	237	428	719	979
Sprats,	—	—	10	16
Whiting,	456	826	1,649	1,621
All other except Shell Fish	571	403	1,432	1,310
Total,	12,887	9,437	35,203	53,321
Shell Fish :—				
Crabs,	1	5	1	8
Lobsters,	123	119	287	435
Mussels,	54	166	353	626
Oysters,	40	47	154	206
Other Shell Fish,	297	328	850	987
Total,	515	665	1,645	2.262
Total Value of Fish landed,	13,402	10,102	36,848	55,583

EMIGRATION FROM IRELAND.

TABLE showing, by Destinations, the Numbers of Emigrants (Natives of Ireland) who left the Ports of Ireland during the Months of January, February, and March, 1915, and the total for the Three Months ended the 31st March, 1915, together with the total Number of Emigrants in each of the corresponding periods of the year, 1914.

DESTINATION.	January, 1915.	February, 1915.	March, 1915.	Three Months ended 31st March, 1915.
FOREIGN COUNTRIES AND THE COLONIES :—				
America (U.S.), .	83	86	120	289
Canada, . . .	37	29	65	131
South Africa, . .	4	4	9	17
Australia, . .	37	38	32	107
New Zealand, . .	12	5	—	17
Other Countries, .	—	1	—	1
Total, . . .	173	163	226	562
GREAT BRITAIN :—				
England and Wales, .	190	155	174	519
Scotland, . . .	3	1	4	8
Total, . . .	193	156	178	527
General Total, 1915,	366	319	404	1,089
General Total, 1914,	497	734	1,426	2,657

The figures in the above Table have been abstracted from the monthly Return published by the Registrar-General for Ireland.

The figures are subject to revision in the Annual Report.

MONTHLY AND QUARTERLY AVERAGE PRICES FOR IRELAND OF CROPS, LIVE STOCK, MEAT, PROVISIONS, &c., for the period ended 31st March, 1915.

PRODUCT.	MONTH.			QUARTER.	
	January.	February.	March.	1915.	1914.
CROPS:	s. d.	s. d.	s. d.	s. d.	s. d.
Wheat, .. per 112 lbs.	11 11	13 7	13 1	13 2	7 5
Oats (White), ,,	9 5	10 5	10 4	9 11	6 3
,, (Black), ,,	9 7	10 11	10 5	10 3	5 7¼
Barley, .. ,,	—	—	—	—	7 1¾
Potatoes, .. ,,	4 0¾	4 0	4 4¼	4 1½	3 0
Hay (Clover), ,,	4 3¼	4 5¼	4 10¼	4 6	3 2½
,, (Meadow) ,,	3 5¾	3 10¼	4 7¼	3 11¾	2 4¾
Grass Seed—					
(Perennial Rye), ,,	13 5	14 0	—	13 7	8 9
(Italian Rye), ,,	—	—	—	—	—
Flax, .. per 14 lbs.	13 11	14 1	—	14 0	6 9
LIVE STOCK:	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Calves (young), per head	2 11 3	2 9 0	2 11 0	2 10 9	2 5 9
Store Cattle—					
Over 6 and not exceeding 12 months, per head	5 19 9	6 0 6	6 9 6	6 5 0	5 12 6
One year old and under two years, per head	9 9 0	9 11 0	9 18 9	9 14 6	9 0 9
Two years old and under three years, per head	12 19 0	13 1 0	13 4 0	13 2 0	11 18 0
Three years old and over, per head	14 18 0	14 14 3	15 9 6	15 4 9	13 18 0
Fat Cattle—					
Two years old and under three years, per head	17 3 6	17 9 0	17 12 6	17 7 6	15 3 9
Three years old and over, per head	20 2 0	19 7 0	19 8 6	19 12 9	16 13 3
Cows and Bulls, ,,	14 8 9	16 2 9	15 0 6	14 19 9	13 9 6
Springers—					
Cows and Heifers, ,,	17 0 0	16 11 9	16 11 0	16 13 9	15 3 9
Milch Cows (down calved) per head	15 19 6	15 8 0	15 6 3	15 11 0	14 3 3
Lambs (under 12 months old), .. per head	1 18 6	2 0 3	1 19 9	1 19 6	1 16 6
Store Sheep—					
One year old and under two years, per head	1 16 6	1 19 6	2 3 0	2 2 0	1 17 3
Two years old and over, per head	1 9 3	1 12 6	2 2 6	1 17 9	1 14 6
Fat Sheep—					
One year old and under two year, per head	2 14 0	2 14 6	2 15 0	2 14 9	2 11 0
Two years old and over per head	2 11 3	2 15 3	2 18 9	2 15 3	2 12 9
Young Pigs—					
8 to 10 weeks old, per head	1 3 3	1 3 0	1 3 9	1 3 6	1 12 9
Store Pigs—					
10 weeks to 4 months old, per head	1 15 3	2 1 0	1 13 9	1 16 3	1 18 9
4 months old and over, ,,	2 4 6	1 17 0	2 5 0	2 4 0	2 6 6
Fat Pigs, .. ,,	5 16 6	5 7 9	5 18 0	5 15 9	5 6 0
Sows, .. ,,	7 10 6	6 18 6	8 0 3	7 15 3	7 3 6
MEAT, PROVISIONS, &c.	s. d.	s. d.	s. d.	s. d.	s. d.
Beef (Live), per 112 lbs.	43 9	45 0	45 9	44 9	35 0
,, (Dead), ,,	76 6	78 9	80 0	78 3	61 3
Mutton (Live) ,,	44 9	47 0	50 3	47 3	45 9
,, (Dead) ,,	78 3	82 3	88 0	82 9	80 0
Pork (Dead) ,,	63 3	64 9	66 6	64 6	63 9
Butter (Creamery), ,,	142 0	138 9	140 3	140 6	118 8
,, (Factory) ,,	124 0	125 6	124 0	124 6	98 10
,, (Farmers) ,,	127 0	124 6	128 0	126 9	101 9
Eggs, .. per 120	15 6	13 4	10 9	12 5	10 2½
Wool, .. per lb.	1 3⅝	1 4⅜	1 5⅜	1 4⅛	1 0⅝

QUARTERLY AVERAGE PRICES FOR EACH PROVINCE, OF CROPS, LIVE STOCK, MEAT, PROVISIONS, &c., for the Quarter ended 31st March, 1915.

PRODUCT.	PROVINCE.			
	Leinster.	Munster.	Ulster.	Connaught.
CROPS:	s. d.	s. d.	s. d.	s. d.
Wheat, .. per 112 lbs.	13 2	—	—	—
Oats (White), .. ,,	10 11	11 2	9 11	9 5
,, (Black), .. ,,	10 8	10 2	—	—
Barley, .. ,,	—	—	—	—
Potatoes .. ,,	4 2¼	5 0¼	3 7	4 4¼
Hay (Clover), .. ,,	5 5	5 0¾	3 6¾	5 1¼
,, (Meadow), .. ,,	3 10¾	4 2¼	—	3 8¼
Grass Seed—				
(Perennial Rye), ,,	—	—	13 7	—
(Italian Rye), ,,	—	—	—	—
Flax, ... per 14 lbs.	—	—	14 0	—
LIVE STOCK:	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Calves (young) .. per head	2 12 9	2 8 3	1 15 3	2 16 6
Store Cattle—				
Over 6 and not exceeding 12 months, .. per head	6 10 9	6 2 3	6 2 3	6 5 9
One year old and under two years, .. per head	10 1 9	9 13 9	9 4 3	9 15 0
Two years old and under three years. per head	13 18 3	12 17 6	11 15 0	13 1 0
Three years old and over, per head	15 16 9	13 10 0	—	15 19 6
Fat Cattle—				
Two years old and under three years, per head	17 15 9	16 18 6	16 19 0	17 0 0
Three years old and over, per head	19 19 6	17 15 0	18 3 3	20 10 9
Cows and Bulls, ,,	17 15 6	13 16 3	16 2 6	19 7 0
Springers—				
Cows and Heifers, per head	17 9 9	15 13 6	16 18 0	17 3 0
Milch Cows (down calved), ,,	15 15 0	15 5 9	16 3 3	14 15 6
Lambs (under 12 months old) per head	2 0 0	1 19 9	1 18 0	1 14 6
Store Sheep—				
One year old and under two years, .. per head	2 0 9	2 3 3	2 5 6	2 4 0
Two years old and over, per head	1 19 3	1 9 0	1 18 0	—
Fat Sheep—				
One year old and under two years, .. per head	2 12 3	2 15 9	2 9 3	3 0 6
Two years old and over ,,	2 15 3	2 12 3	2 5 9	3 4 6
Young Pigs—				
8 to 10 weeks old, per head	1 2 0	1 5 3	1 5 0	0 17 9
Store Pigs—				
10 weeks to 4 months old, per head	2 0 0	1 9 3	—	—
4 months old and over, ,,	2 9 9	1 19 0	—	3 5 0
Fat Pigs, .. ,,	4 18 6	4 9 0	—	6 8 0
Sows, ... ,,	7 3 3	7 17 9	5 17 0	8 11 9
MEAT, PROVISIONS, &c.	s. d.	s. d.	s. d.	s. d.
Beef (Live), .. per 112lbs.	44 9	—	—	—
,, (Dead), .. ,,	78 3	—	—	—
Mutton (Live), .. ,,	47 3	—	—	—
,, (Dead), .. ,,	82 9	—	—	—
Pork (Dead), .. ,,	58 6	65 0	60 3	62 3
Butter (Creamery) ,,	139 6	140 9	—	—
,, (Factory), ,,	—	124 6	—	—
,, (Farmers), ,,	126 9	128 3	121 3	120 6
Eggs, .. per 120	13 2	12 1	—	11 4
Wool, ... per lb.	1 4½	—	—	1 4½

Number of Animals included in Returns furnished under the Markets and Fairs (Weighing of Cattle) Act, 1891, Sections 3 and 4, during the Quarter ended 31st March, 1915.

Week Ended	Fat Cattle.					Fat Sheep.			
	Dublin.		Belfast.		Total Number of Cattle included in Returns.	Dublin.		Belfast.	Total Number of Sheep included in Returns.
	Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	Mr. John Robson, Auctioneer.		Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	
1915.									
January 7 . .	55	178	69	62	364	—	262	—	262
" 14 . .	51	181	67	75	374	—	309	—	309
" 21 . .	40	159	71	51	321	7	144	—	151
" 28 . .	45	117	66	58	286	—	245	—	245
February 4 . .	42	109	71	40	262	—	166	—	166
" 11 . .	39	137	65	45	286	—	221	—	221
" 18 . .	34	167	68	37	306	—	332	—	332
" 25 . .	42	123	64	41	270	—	257	—	257
March 4 . .	45	131	72	47	295	—	206	—	206
" 11 . .	62	165	63	45	335	—	231	—	231
" 18 . .	52	141	66	49	308	—	244	—	244
" 25 . .	62	152	64	41	319	—	215	—	215
Totals, . .	569	1,760	806	591	3,726	7	2,832	—	2,839

Weekly Average Prices of Wheat, Oats, and Barley, per 112 lbs. computed from Market Returns of certain quantities of these Cereals supplied by Officers of Customs and Excise, during the Quarter ended 31st March, 1915.

Returns received in the Week ended		Wheat. Average Price per 112 lbs.	Wheat. Quantity.	Oats. Average Price per 112 lbs.	Oats. Quantity.	Barley. Average Price per 112 lbs.	Barley. Quantity.
1915.		s. d.	Cwts. of 112 lbs.	s. d.	Cwts. of 112 lbs.	s. d.	Cwts. of 112 lbs.
January	2	12 0	60	8 9	5,174	—	—
,,	9	11 3	125	9 4	5, 25	—	—
,,	16	12 3	325	9 5	5,717	—	—
,,	23	11 4	16	9 8	8 417	—	—
,,	30	—	—	9 11	6,995	—	—
February	6	13 8	258	10 5	7,059	—	—
,,	13	14 0	125	10 8	5,163	—	—
,,	20	13 7	1,000	10 7	7,674	—	—
,,	27	13 3	451	10 8	5,519	—	—
March	6	13 2	75	10 6	4,755	—	—
,,	13	13 2	125	10 5	3,270	—	—
,,	20	—	—	10 4	4,504	—	—
,,	27	12 10	125	10 4	3,791	—	—

Quarterly Average Prices of Fat Cattle and Fat Sheep, per 112 lbs., Live Weight, sold in Dublin Markets during the period ended 31st March, 1915, and also for the corresponding period during eighteen preceding years.

Year.	Fat Cattle.	Fat Sheep.	Year.
	£ s. d.	£ s. d.	
1915,	2 4 9	2 7 3	1915.
1914,	1 15 0	2 5 9	1914.
1913,	1 16 1	2 2 0	1913.
1912,	1 16 3	1 17 4	1912.
1911,	1 13 4	1 17 6	1911.
1910,	1 13 8	1 19 6	1910.
1909,	1 13 2	1 12 2	1909.
1908,	1 12 9	2 0 0	1908.
1907,	1 12 0	2 3 2	1907.
1906,	1 10 11	2 2 6	1906.
1905,	1 11 5	1 19 9	1905.
1904,	1 10 9	1 19 7	1904.
1903,	1 13 10	2 1 1	1903.
1902,	1 12 6	1 14 8	1902.
1901,	1 12 5	1 16 10	1901.
1900,	1 13 2	1 17 5	1900.
1899,	1 11 8	1 14 1	1899.
1898,	1 9 9	1 16 10	1898.
1897,	1 11 4	1 17 0	1897.

BUTTER PRICES DURING THE QUARTER

ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW,"

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the an Irish Creamery would be 5*s.* to 7*s.* per cwt. less than freight, commission,

Country of Origin.	Type of Package,	Place of Sale.	Week Ended January 2nd.	Week Ended January 9th.	Week Ended January 16th.	Week Ended January 23rd.
			Per cwt *s.* *s.*	Per cwt. *s.* *s.*	Per cwt. *s.* *s.*	Per cwt. *s.* *s.*
IRELAND— Creamery Butter,	Kiels, kegs, or pyramid boxes	London,	—	—	—	—
		Liverpool,	136–138	—	—	—
		Bristol,	—	—	—	—
		Cardiff,	—	134	—	—
		Manchester,	146–150	146–148	—	—
		Birmingham,	—	—	—	—
		Glasgow,	—	—	—	—
		Limerick,	—	—	—	—
		Cork,	—	—	—	—
		Belfast,	—	—	—	—
		Dublin,	148–150	144/8–149/4	149/4	146–149 4
	1lb. rolls, in boxes, Salted or Unsalted.	F.O.R.,	—	158/8	158/8	158/8
Factories,		London,	—	—	—	—
		Liverpool,	120–126	—	—	—
		Bristol,	128–132	—	—	—
		Cardiff,	—	—	—	—
		Manchester,	—	—	—	—
Farmers' Butter,	Firkins 1st, Export Price	Cork,	139	139	140	—
	Do. 2nd „	Cork,	121	121–125	125–134	135
	Do. 3rd „	Cork,	115	118–119	120	—
	Fresh,	Cork,	126–130	126–135	133–136	138–140
FRANCE,	12×2lb. rolls,	London,	Per doz. lbs. 13–16	Per doz. lbs. 13–16	Per doz. lbs. 13–16	Per doz. lbs. 13/6–16/6
	Paris baskets,	do.,	Per cwt. 130–139	Per cwt. 130–139	Per cwt. 130–139	Per cwt. 136–145
DENMARK AND SWEDEN.		Copenhagen Quotation.	133 Kr. per 50 Kilos = 140/1 per cwt.	133 Kr. per 50 Kilos = 140/1 per cwt.	135 Kr. per 50 Kilos = 142/2 per cwt.	132 Kr. per 50 Kilos = 138/3 per cwt.
		Average over-price	—	—	—	—
	Kiels,	London,	150–154	150–154	150–156	150–154
		Liverpool,	155–160	152–159	150–156	149–154
		Bristol,	—	—	—	—
		Cardiff,	—	161	161	160–161
		Manchester,	152–157	151–156	150–155	147–154
		Birmingham,	155–158	155–157	154–156	153–156
		Newcastle-on-Tyne,	147–150	148–152	150–154	145–152
		Glasgow,	153–154	153–154	153–154	152–153
		Leith,	151	148–150	151	151
		Hull,	153–155	151–153	151–152	152–153
	1lb. rolls, 10×24 lb. boxes.	F.O.R. London	—	—	—	—
FINLAND	Kiels,	Manchester,	150–154	149–153	149–152	147–152
		Liverpool,	—	—	—	—
		Hull,	147–148	147–149	146–148	146–147
		Cardiff,	—	—	—	—

ENDED 31st MARCH, 1915.

"Grocer's Gazette," and Other Trade Reports.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED								
	February.				March.			
30th.	6th.	13th.	20th.	27th.	6th.	13th.	20th.	27th.
Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	138-140	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	147-148
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
144/8-149 4 2158/8	140-144 154	138-140 154	134-136 154	35 4 154	133-135 4 149/4	140 149/4	144/8-149 4 149/4	149/4 144/8
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
145	147	—	147	—	145	145	148	148
135-139	133-137	130-136	114-117	116-124	122-128	125-130	129-133	124-137
121	120	120-127	111-120	112	118	118	—	123-124
139-143	136-141	135	122-125	126-129	126-140	131-135	135-140	134-139
Per doz. lbs. 14/-16/6 Per cwt. 140-144	Per doz. lbs. 14-16/6 Per cwt. 140 144	Per doz. lbs. 14/-16/6 Per cwt 136-144	Per doz lbs. 14/-16/6 Per cwt. 136-141	Per doz. lbs. 13/6-16 6 Per cwt. 136-141	Per doz. lbs. 13/6-16/6 Per cwt. 136-144	Per doz. lbs. 13/6-16/6 Per cwt. 136-145	Per doz. lbs. 13/6-16 6 Per cwt. 136-141	Per doz. lbs. 13/6-16/6 Per cwt. 136-141
128 Kr. per 50 Kilos 135/8 = per cwt.	126 Kr per 50 Kilos 133/7 - per cwt.	122 Kr. per 50 Kilos 129/3 — per cwt.	118 Kr. per 50 Kilos 125/0 — per cwt.	118 Kr. per 50 Kilos 124/6 — per cwt.	121 Kr. per 50 Kilos 127/8 = per cwt.	128 Kr. per 50 Kilos 134/3 — per cwt.	128 Kr. per 50 Kilos 134/3 — per cwt.	125 Kr. per 50 Kilos 131/1 = per cwt.
—	—	—	—	—	—	—	—	—
144-148	142-146	138-140	132-136	130-136	138-140	146-148	146-148	140-143
142-148	140-145	136-141	134-137	131-138	133-142	141-152	145-152	140-146
—	—	—	—	—	—	—	—	—
158	150-152	148	140	144	140	143	150	150
142-150	139-145	137-144	130-138	129-136	131-136	139-144	147-152	142-150
149-152	141-147	141-145	136-140	134-136	135-137	141-143	149-151	148-150
140-147	138-143	134-140	133-136	128-133	130-141	138-150	146-149	138-146
148-149	144-145	142-143	137-138	133-134	135-136	141-142	147-148	145-146
146-147	140-141	139-140	135-136	131	132	139	148-149	148
146-147	140-145	137-139	136-138	128-130	130-132	138-148	143-148	144-148
—	—	—	—	—	—	—	—	—
140-145	138-141	136-140	128-134	127-133	131-134	135-140	144-150	140-146
—	—	—	—	—	—	—	—	—
141-142	136-138	134-136	133-135	126-128	128-130	134-144	142-144	143-146
—	—	—	—	—	—	—	—	—

[Continued on pages 660 and 661.

BUTTER PRICES DURING THE QUARTER

Abstracted from "The Grocer," "Grocer's Review,"

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the
an Irish Creamery would be 5*s*. to 7*s*. per cwt. less than
freight, commission,

Country of Origin.	Type of Package.	Place of Sale.	Week Ended. January 2nd.	9th.	16th.	23rd.
			Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
Russia and Siberia,	Kiels, .	London, .	128–132	126–132	134–138	136–138
		Liverpool, .	128–132	128–132	—	—
		Bristol, .	132–136	—	—	—
		Cardiff, .	—	—	—	—
		Manchester, .	128–132	—	134–136	—
		Birmingham, .	—	—	—	139–141
		Glasgow, .	—	—	—	—
		Leith, .	—	—	—	—
		Hull, .	—	—	—	—
Holland, .	Boxes, .	London, .	—	—	—	—
	Rolls, .	do., .	16–16/6	16–16/6	—	16–16/6
	Boxes, .	Glasgow.—				
		Fresh, .	—	—	—	—
		Salt, .	—	—	—	—
		Manchester, .	—	—	—	—
		Hull, .	156–158	154–156	152–154	154–155
			Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
Italy, .	Rolls, .	London, .	—	—	—	—
			Per cwt.	Per cwt.	Per cwt.	Per cwt.
Canada, .	56 lb. Boxes, .	London, .	—	—	—	—
		Liverpool, .	—	—	—	—
		Bristol, .	—	—	—	—
		Cardiff, .	—	—	—	—
		Birmingham, .	—	—	—	—
		Manchester, .	—	—	—	—
		Glasgow, .	—	—	—	—
Australia and New Zealand, *	Boxes, .	London, .	A.s. 134–136	A.s. 134–138	A.s. 138–142	A.s. 140–141
			u. 134–138	u. 136–138	u. 138–142	u. 140–141
			Z. 136–140	Z. 138–140	Z. 140–144	Z. 142–146
		Liverpool, .	A. 136–140	A. 136–142	A. 140–146	A. 143–146
			Z. 137–144	Z. 139–146	Z. 145–150	Z. 146–149
		Bristol, .	A. 138–141	A. 139–142	A. 142–144	A. 144–148
			Z. 142–144	Z. 142–146	Z. 146–148	Z. 148–152
		Cardiff, .	A. —	A. 140–144	A. 144–146	A. 146–150
			Z. —	Z. 140–146	Z. 146–148	Z. 149–152
		Manchester, .	A. 138–140	A. 138–142	A. 142–144	A. 143–146
			Z. 140–143	Z. 142–144	Z. 142–145	Z. 146–149
		Birmingham, .	A. 139–141	A. 139–141	A. 140–142	A. 144–146
			Z. 141–143	Z. 142–144	Z. 142–146	Z. 146–148
		Glasgow, .	A. 139–140	A. 140–141	A. 142–144	A. 145–146
			Z. 142–144	Z. 142–144	Z. 146–147	Z. 146–148
		Leith, .	A. 138–140	A. 138–140	A. 140–142	A. 145
			Z. 140–142	Z. 140–142	Z. 144	Z. 147
		Hull, .	A. 137–138	A. 137–138	A. 140–142	A. 142–144
			Z. 138–140	Z. 140–141	Z. 142–144	Z. 144–146
Argentina, .	Boxes, .	London, .	134–136	134–138	136–140	140–144
		Liverpool, .	134–138	134–142	138–144	140–145
		Bristol, .	138–140	140–142	142–144	146–148
		Cardiff, .	—	144–146	146	—
		Manchester, .	—	—	140–142	142–146
		Birmingham, .	—	—	—	—
		Glasgow, .	139–140	140–141	142–143	142–143
United States,	Tubs and boxes, .	London, .	—	—	—	—
		Liverpool, .	—	—	—	—
		Bristol, .	—	—	—	—
		Cardiff, .	—	—	—	—
		Manchester, .	—	—	—	—

ENDED 31st MARCH, 1915—*Continued.*

"Grocer's Gazette," and other Trade Reports.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED.								
	February				March			
30th.	6th.	13th.	20th.	27th.	6th.	13th.	t h.	27th.
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.
—	—	—	—	—	128–130	130–134	132–136	130–134
—	—	—	—	—	—	—	—	—
—	—	—	—	—	134	136–138	140–142	140–142
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	132–134	—	135–140
138–140	138–140	136–138	—	—	133–135	133–135	138–140	138–140
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
--	16–16 6	16–16/6	16–16/6	--	15–15/6	--	16–16/6	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
145–147	118–150	145–146	143–145	133–134	132–135	138–140	145–147	140–149
Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
—	—	—	—	—	—	—	—	—
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
A.s. 136–140	A.s. 134–138	A.s. 132–134	A.s. 126–130	A.s. 126–130	A.s. 130–135	A.s. 136–140	A.s. 138–142	A.s. 132–136
u. 136–140	u. 134–138	u. 132–136	u. 128–134	u. 128–132	u. 132–136	u. 136–140	u. 138–144	u. 134–138
Z. 140–144	Z. 138–142	Z. 134–138	Z. 128–136	Z. 128–132	Z. 134–138	Z. 138–142	Z. 142–146	Z. 136–142
A. 140–143/6	A. 137–142	A. 134–140	A. 132–135	A. 129–134	A. 132–138	A. 135–144	A. 141–144	A. 134–140
Z. 143–146	Z. 139–144	Z. 136–141	Z. 133–136	Z. 131–136	Z. 135–142	Z. 139–147	Z. 144–148	Z. 138–144
A. 142–146	A. 138–144	A. 136–142	A. 130–137	A. 130–135	A. 134–138	A. 140–142	A. 142–145	A. 138–144
Z. 146–150	Z. 142–146	Z. 140–142	Z. 134–139	Z. 133–137	Z. 138–142	Z. 143–145	Z. 146–148	Z. 143–146
A. 144–149	A. 142–145	A. 136–142	A. 133–136	A. 133–135	A. 134–136	A. 138–143	A. 141–147	A. 142–145
Z. 145–154	Z. 144–146	Z. 138–141	Z. 136–139	Z. 134–136	Z. 138–140	Z. 140–144	Z. 146–150	Z. 144–147
A. 142–144	A. 138–142	A. 138–140	A. 132–134	A. 128–132	A. 132–134	A. 135–137	A. 142–144	A. 140–142
Z. 145–147	Z. 140–144	Z. 139–142	Z. 132–136	Z. 130–132	Z. 133–136	Z. 138–142	Z. 144–145	Z. 143–146
A. 143–145	A. 140–142	A. 139–140	A. 133–135	A. 130–132	A. 133–135	A. 136–138	A. 142–144	A. 142–144
Z. 146–148	Z. 142–144	Z. 141–142	Z. 134–136	Z. 132–134	Z. 134–136	Z. 140–141	Z. 145–147	Z. 145–147
A. 145–146	A. 142–144	A. 140–142	A. 134–135	A. 130–131	A. 134–136	A. 136–138	A. 142–143	A. 140–142
Z. 146–148	Z. 144–146	Z. 142–144	Z. 136–138	Z. 132–133	Z. 138–140	Z. 140–142	Z. 146–148	Z. 144–146
A. 142–143	A. 140	A. —	A. 134–136	A. —	A. 134	A. —	A. —	A. —
Z. 144–145	Z. 140–142	Z. —	Z. —	Z. —	Z. 136	Z. —	Z. —	Z. —
A. 142–143	A. 140–142	A. 138–140	A. 130–132	A. —	A. 130–131	A. 132–133	A. 141–143	A. 139–140
Z. 144–146	Z. 142–143	Z. 140–142	Z. 133–135	Z. —	Z. 132–133	Z. 133–134	Z. 141–145	Z. 140–144
136–140	134–138	132–134	—	126–132	128–132	134–138	136–140	132–136
138–144	136–142	133–139	131–135	128–134	132–134	134–144	140–143	134–139
144–146	138–144	136–142	134–138	132–136	—	—	—	—
—	—	—	—	—	—	—	—	—
140–142	138–140	136–138	—	128–130	—	—	—	—
—	—	—	—	—	—	—	—	—
140–141	137–138	135–136	132–133	130–131	132–134	136	140	139
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—

TABLES SHOWING THE EXPORT

TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT
the PORTS OF EMBARKATION

PORTS IN IRELAND.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina, .	45	—	—	—	18	—	63	—	—	—	—
Belfast, .	6,737	19.849	1,552	2,470	563	158	31,329	75	—	—	75
Coleraine .	—	—	—	—	—	—	—	—	—	—	—
Cork, .	5,697	21,832	573	1.493	325	834	30,754	3.320	2,592	18	5.930
Drogheda, .	6,363	48	320	14	—	1	6,746	888	—	15	903
Dublin, .	45,068	35,908	7,419	366	31	2,995	91,787	25,969	4	—	25,973
Dundalk, .	6,[illegible]57	4,619	237	190	309	—	11,712	706	—	5	711
Greenore, .	195	956	390	417	—	—	1,958	11	—	—	11
Larne, .	347	7,651	13	83	—	508	8,602	—	—	—	—
Limerick, .	—	—	—	—	24	—	24	—	—	—	—
Londonderry,	5,340	16,802	233	862	1,550	2,651	27,438	1.446	54	—	1,500
Milford, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Newry, .	1,095	1,669	2	12	—	—	2,778	178	—	—	178
Portrush, .	—	—	—	—	—	—	—	—	—	—	—
Sligo, .	410	141	—	2	—	—	553	65	—	—	65
Waterford, .	11,010	14,184	3	22	24	1,040	26,283	3,472	—	23	3.495
Westport, .	6	2	—	—	46	—	54	—	—	—	—
Wexford, .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	88,670	123,661	10,742	5,931	2,890	8,187	240.081	36,130	2,650	61	38,841

TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT
the PORTS OF DEBARKATION

PORTS IN GREAT BRITAIN.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total	Fat.	Stores.	Lambs.	Total.
Ardrossan, .	—	—	—	—	—	—	—	—	—	—	—
Ayr, .	579	11,182	63	262	20	81	12,187	—	—	—	—
Barrow, .	—	—	—	—	—	—	—	—	—	—	—
Bristol, .	996	8,429	91	301	—	263	10,080	1.324	1,995	—	3,319
Cardiff, .	—	—	—	—	—	—	—	—	—	—	—
Dover .	—	—	—	—	—	—	—	—	—	—	—
Falmouth, .	—	—	—	—	—	—	—	—	—	—	—
Fishguard, .	2,285	18,449	355	993	—	1,240	23,322	3,071	597	8	3,676
Fleetwood, .	2,452	1.708	1,050	520	—	8	5,738	75	—	—	75
Glasgow, .	11,388	18,395	1,632	2,233	2,450	4,530	40,628	253	—	—	253
Greenock, .	1,019	6,816	3	53	41	41	7,973	—	—	—	—
Heysham, .	3,316	14,631	3,132	459	7	58	21,603	1,515	54	—	1,569
Holyhead, .	12,409	20,651	2,904	561	18	1,076	37,619	3,712	4	—	3,716
Liverpool, .	47,359	15,508	1,483	466	354	382	65,552	21,697	—	53	21,750
London, .	—	—	—	—	—	—	—	—	—	—	—
Manchester, .	5,857	—	3	—	—	—	5,860	4,483	—	—	4,483
Newhaven, .	—	—	—	—	—	—	—	—	—	—	—
Plymouth, .	—	—	—	—	—	—	—	—	—	—	—
Preston, .	—	—	—	—	—	—	—	—	—	—	—
Silloth, .	663	256	13	—	—	—	932	—	—	—	—
Southampton,	—	—	—	—	—	—	—	—	—	—	—
Stranraer, .	347	7,636	13	83	—	508	8,587	—	—	—	—
Whitehaven,	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	88,670	123,661	10,742	5,931	2,890	8,187	240,081	36,130	2,650	61	38,841

AND IMPORTS OF ANIMALS.

I.

BRITAIN during the Three Months ended 31ST MARCH, 1915, showing IN IRELAND.

Swine. Fat.	Swine. Stores.	Swine. Total.	Goats.	Horses. Stallions.	Horses. Mares.	Horses. Geldings.	Horses. Total.	Mules or Jennets	Asses.	Total Animals	Ports in Ireland
54	—	54	—	—	—	—	—	—	—	117	Ballina.
873	1,429	2,302	3	3	548	1,068	1,619	3	3	35,334	Belfast.
—	—	—	—	—	—	—	—	—	—	—	Coleraine.
2,690	11	2,701	1	2	111	101	214	—	6	39,606	Cork.
1,362	122	1,484	12	—	6	3	9	—	—	9,154	Drogheda.
29,785	25	29,810	1	28	923	779	1,730	1	10	149,312	Dublin.
7,115	49	7,164	93	—	38	27	65	—	—	19,745	Dundalk.
154	83	237	2	—	394	356	750	—	—	2,958	Greenore.
4	694	698	—	2	148	305	455	—	—	9,755	Larne.
—	—	—	—	—	—	—	—	—	—	24	Limerick.
2,127	6	2,133	1	1	64	106	171	—	2	31,245	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Milford.
—	—	—	—	—	—	—	—	—	—	—	Mulroy.
250	—	250	—	—	—	1	1	—	—	3,207	Newry.
—	—	—	—	—	—	—	—	—	—	—	Portrush.
4,389	—	4,389	—	—	2	—	2	—	—	5,009	Sligo.
9,672	—	9,672	—	—	165	190	355	—	2	39,807	Waterford.
—	—	—	—	—	—	—	—	—	—	54	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
58,475	2,419	60,894	113	36	2,399	2,936	5,371	4	23	345,327	TOTAL.

II.

BRITAIN during the Three Months ended 31ST MARCH, 1915, showing IN GREAT BRITAIN.

Swine. Fat.	Swine. Stores.	Swine. Total.	Goats.	Horses. Stallions	Horses. Mares.	Horses. Geldings.	Horses. Total.	Mules or Jennets	Asses.	Total Animals	Ports in Great Britain.
—	—	—	—	—	116	346	462	—	—	462	Ardrossan.
271	1,428	1,699	—	1	39	62	102	—	1	13,989	Ayr.
—	—	—	—	—	—	—	—	—	—	—	Barrow.
697	—	697	—	—	26	34	60	—	2	14,158	Bristol.
—	—	—	—	—	—	—	—	—	—	—	Cardiff.
—	—	—	—	—	—	—	—	—	—	—	Dover
—	—	—	—	—	—	—	—	—	—	—	Falmouth
8,107	—	8,107	1	2	219	223	444	—	6	35,556	Fishguard.
—	1	1	2	1	194	312	507	2	—	6,325	Fleetwood
4,542	17	4,559	2	2	250	337	589	—	2	46,033	Glasgow.
390	—	390	—	1	4	2	7	—	1	8,371	Greenock.
2,402	—	2,402	—	—	147	221	368	—	1	25,943	Heysham.
21,679	108	21,787	2	21	1,068	872	1,961	—	4	65,089	Holyhead.
19,780	171	19,951	106	6	166	192	364	2	4	107,729	Liverpool.
—	—	—	—	—	—	—	—	—	—	—	London.
569	—	569	—	—	3	9	12	—	—	10,924	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	—	—	—	—	10	9	19	—	—	19	Plymouth.
—	—	—	—	—	4	3	7	—	—	7	Preston.
38	—	38	—	—	—	—	—	—	2	972	Silloth.
—	—	—	—	—	5	9	14	—	—	14	Southampton.
—	694	694	—	2	148	305	455	—	—	9,736	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Whitehaven.
58,475	2,419	60,894	113	36	2,399	2,936	5,371	4	23	345,327	TOTAL.

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT
the PORTS OF

Irish Ports.	Cattle. Fat	Stores (fattening)	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Sheep. Fat.	Stores.	Lambs.	Total.
Ballina, .	—	—	—	—	—	—	—	—	—	—	—
Belfast, .	—	9	—	—	31	—	40	777	3	—	780
Coleraine, .	—	—	—	—	—	—	—	—	—	—	—
Cork, .	—	2	—	—	—	—	2	—	—	—	—
Drogheda, .	—	—	—	—	—	—	—	—	—	—	—
Dublin, .	—	41	—	—	—	—	41	127	3	—	130
Dundalk, .	—	—	—	—	—	—	—	—	—	—	—
Greenore, .	—	—	—	—	—	—	—	—	—	—	—
Larne, .	—	9	—	—	—	—	9	102	—	—	102
Limerick, .	—	—	—	—	—	—	—	—	—	—	—
Londonderry,	—	26	—	—	—	—	26	—	6	—	6
Milford, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Newry, .	—	—	—	—	—	—	—	—	—	—	—
Portrush, .	—	—	—	—	—	—	—	—	—	—	—
Sligo, .	—	—	—	—	1	—	1	—	—	—	—
Waterford, .	—	1	—	—	—	—	1	—	—	—	—
Westport, .	—	—	—	—	—	—	—	—	—	—	—
Wexford, .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	—	88	—	—	32	—	120	1,006	12	—	1,018

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT
the PORTS of EMBARKATION

British Ports.	Cattle. Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Sheep. Fat.	Stores.	Lambs.	Total.
Ardrossan, .	—	—	—	—	26	—	26	227	3	—	230
Ayr, .	—	9	—	—	2	—	11	622	—	—	622
Barrow, .	—	—	—	—	—	—	—	—	—	—	—
Bristol, .	—	—	—	—	—	—	—	—	—	—	—
Cardiff, .	—	—	—	—	—	—	—	—	—	—	—
Falmouth, .	—	—	—	—	—	—	—	—	—	—	—
Fishguard, .	—	1	—	—	—	—	1	—	—	—	—
Fleetwood, .	—	—	—	—	2	—	2	—	—	—	—
Glasgow, .	—	50	—	—	1	—	51	127	6	—	133
Greenock, .	—	—	—	—	—	—	—	—	—	—	—
Heysham, .	—	1	—	—	1	—	2	—	—	—	—
Holyhead, .	—	11	—	—	—	—	11	—	3	—	3
Liverpool, .	—	—	—	—	—	—	—	—	—	—	—
London, .	—	—	—	—	—	—	—	—	—	—	—
Manchester, .	—	—	—	—	—	—	—	—	—	—	—
Newhaven, .	—	—	—	—	—	—	—	—	—	—	—
Plymouth, .	—	—	—	—	—	—	—	—	—	—	—
Preston, .	—	—	—	—	—	—	—	—	—	—	—
Silloth, .	—	6	—	—	—	—	6	—	—	—	—
Southampton,	—	1	—	—	—	—	1	—	—	—	—
Stranraer .	—	9	—	—	—	—	9	30	—	—	30
Swansea, .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, .	—	88	—	—	32	—	120	1,006	12	—	1,018

III.

BRITAIN during the Three Months ended 31ST MARCH, 1915, showing DEBARKATION IN IRELAND.

Swine. Fat.	Swine. Stores.	Swine. Total.	Goats.	Horses. Stallions.	Horses. Mares.	Horses. Geldings.	Horses. Total.	Mules or Jennets	Asses.	Total Animals	IRISH PORTS.
—	—	—	—	—	—	—	—	—	—	—	Ballina.
—	—	—	—	10	8	13	31	1	—	852	Belfast.
—	—	—	—	—	3	—	3	—	—	3	Coleraine.
—	1	1	—	6	22	14	42	—	—	45	Cork.
—	—	—	—	—	—	—	—	—	—	—	Drogheda.
—	—	—	2	26	198	62	286	—	—	459	Dublin.
—	—	—	—	—	3	1	4	—	—	4	Dundalk.
—	—	—	—	2	19	6	27	—	2	29	Greenore.
—	—	—	—	10	7	5	22	—	—	133	Larne.
—	—	—	—	—	—	—	—	—	—	—	Limerick.
—	—	—	—	1	11	18	30	—	—	62	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Milford.
—	—	—	—	—	—	—	—	—	—	—	Mulroy.
—	—	—	—	—	1	1	2	—	—	2	Newry.
—	—	—	—	—	—	—	—	—	—	—	Portrush.
—	—	—	—	—	—	—	—	—	—	1	Sligo.
—	—	—	2	3	17	14	34	—	—	37	Waterford.
—	—	—	—	—	—	—	—	—	—	—	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
—	1	1	4	58	289	134	481	1	2	1,627	TOTAL.

IV.

BRITAIN during the Three Months ended 31ST MARCH, 1915, showing IN GREAT BRITAIN.

Swine. Fat.	Swine. Stores.	Swine. Total.	Goats.	Horses. Stallions.	Horses. Mares.	Horses. Geldings.	Horses. Total.	Mules or Jennets	Asses.	Total Animals	BRITISH PORTS.
—	—	—	—	—	3	5	8	—	—	264	Ardrossan.
—	—	—	—	3	1	1	5	—	—	638	Ayr.
—	—	—	—	—	—	—	—	—	—	—	Barrow.
—	—	—	—	—	—	—	—	—	—	—	Bristol.
—	—	—	—	—	—	—	—	—	—	—	Cardiff.
—	—	—	—	—	—	—	—	—	—	—	Falmouth.
—	—	—	2	9	23	22	54	—	—	57	Fishguard.
—	—	—	—	6	3	1	10	—	—	12	Fleetwood.
—	—	—	—	4	67	34	105	—	—	289	Glasgow.
—	—	—	—	—	1	4	5	—	—	5	Greenock.
—	—	—	—	—	1	1	2	1	—	5	Heysham.
—	—	—	2	26	160	50	236	—	2	251	Holyhead.
—	—	—	—	—	9	4	13	—	—	13	Liverpool.
—	—	—	—	—	—	—	—	—	—	—	London.
—	—	—	—	—	—	1	1	—	—	1	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	1	1	—	—	14	6	20	—	—	21	Plymouth.
—	—	—	—	—	—	—	—	—	—	—	Preston.
—	—	—	—	—	—	—	—	—	—	6	Silloth.
—	—	—	—	—	—	—	—	—	—	1	Southampton.
—	—	—	—	10	7	5	22	—	—	61	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Swansea.
—	1	1	4	58	289	134	481	1	2	1,627	TOTAL.

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the
showing the PORTS of

Irish Ports.	Cattle.					Sheep.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
Belfast, .	—	1	—	—	1	—	—	—
Dublin, .	—	11	—	—	11	—	—	—
Total, .	—	12	—	—	12	—	—	—

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the
showing the PORTS of DEBARKATION

Isle of Man Port.	Cattle.					Sheep.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
Douglas, .	—	12	—	—	12	—	—	—

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the
showing the PORTS of

Irish Ports.	Cattle.					Sheep.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
Belfast, .	—	—	—	—	—	—	—	—
Dublin, .	—	—	—	—	—	—	—	—
Total, .	—	—	—	—	—	—	—	—

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the
showing the PORTS of EMBARKATION

Isle of Man Port.	Cattle					Sheep.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
Douglas, .	—	—	—	—	—	—	—	—

Isle of Man during the Three Months ended 31st March, 1915,
Embarkation in **Ireland.**

Swine.			Goats	Horses.				Mules or Jennets.	Asses.	Total Animals.	Irish Ports.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	1	1	2	—	—	3	Belfast.
—	—	—	—	—	—	—	—	—	—	11	Dublin.
—	—	—	—	—	1	1	2	—	—	14	Total

Isle of Man during the Three Months ended 31st March, 1915,
in the **Isle of Man.**

Swine.			Goats.	Horses.				Mules or Jennets.	Asses.	Total Animals.	Isle of Man Port.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	1	1	2	—	—	14	Douglas.

Isle of Man during the Three Months ended 31st March, 1915,
Debarkation in **Ireland.**

Swine.			Goats.	Horses				Mules or Jennets.	Asses.	Total Animals.	Irish Ports.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	—	—	—	—	—	Belfast.
—	—	—	—	—	—	—	—	—	—	—	Dublin.
—	—	—	—	—	—	—	—	—	—	—	Total.

Isle of Man during the Three Months ended 31st March, 1915,
in the **Isle of Man.**

Swine.			Goats.	Horses.				Mules or Jennets.	Asses.	Total Animals.	Isle of Man Port.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	—	—	—	—	—	Douglas.

RETURN OF THE NUMBER OF ANIMALS SHIPPED to and from Places in the Places of Embarkation

Irish Ports.	Cattle.					Sheep.			Swine.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs	Total.	Fat.	Stores.	Total.
Cork to Aghada Pier, .	—	—	—	—	—	—	—	—	—	—	—
,, to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
,, to Spike Island, .	—	—	—	—	—	—	—	—	—	—	—
,, to Queenstown, .	—	—	—	—	—	—	—	—	—	—	—
,, to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	—	—	—	—	—	—	—	—	—	—	—
Aghada Pier to Cork, .	—	—	—	—	—	—	—	—	—	—	—
Belfast ,, .	—	—	—	—	—	—	—	—	—	—	—
Spike Island ,, .	—	—	—	—	—	—	—	—	—	—	—
Queenstown ,, .	—	—	—	—	—	—	—	—	—	—	—
Waterford ,, .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	—	—	—	—	—	—	—	—	—	—	—
Waterford to Ballyhack,	—	—	—	—	—	—	—	—	—	—	—
,, to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
,, to Duncannon	—	17	—	9	26	—	—	—	—	7	7
Total, . .	—	17	—	9	26	—	—	—	—	7	7
Ballyhack to Waterford,	68	—	—	—	68	1	—	1	10	—	10
Dublin to Belfast, .	143	3	—	—	146	506	—	506	—	—	—
Duncannon to Waterford,	204	12	—	—	216	9	—	9	196	—	196
Kilrush to Limerick, .	—	11	—	—	11	—	—	—	553	—	553
Kildysart ,, .	—	—	—	—	—	—	—	—	—	—	—
Glin, ,, .	—	—	—	—	—	—	—	—	—	—	—
Portumna, ,, .	—	—	—	—	—	—	—	—	—	—	—
Tarbert, ,, .	—	—	—	—	—	—	—	—	—	—	—
Kilkee, ,, .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	—	11	—	—	11	—	—	—	553	—	553
Milford to Portrush,	—	—	—	—	—	—	—	—	—	—	—
Belfast to Dublin, .	6	1	—	—	7	—	—	—	—	—	—
Londonderry to Mulroy,	—	—	—	—	—	—	—	—	—	—	
Moville to Londonderry,	—	9	1	—	10	—	—	—	—	—	—
Ballina to Sligo, . .	—	—	—	—	—	—	—	—	—	—	—
Belmullet ,, . .	69	—	—	—	69	—	—	—	864	—	864
Westport ,, . .	—	—	—	—	—	—	—	—	—	—	—
Total, .	69	—	—	—	69	—	—	—	864	—	864
Sligo to Ballina, . .	—	—	—	—	—	—	—	—	—	—	—
Milford to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy to Milford, .	—	—	—	—	—	—	—	—	—	—	—
Dublin to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Leitbeg to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	490	53	1	9	553	516	—	516	1,623	7	1,630

INLAND NAVIGATION.

Ireland during the Three Months ended 31st March, 1915, showing and Debarkation.

Goats.	Horses. Stallions.	Mares.	Geldings.	Total.	Mules or Jennets.	Asses.	Total Animals.	Irish Ports.
—	—	—	—	—	—	—	—	Cork to Aghada Pier.
—	—	—	—	—	—	—	—	" to Belfast.
—	—	—	—	—	—	—	—	" to Spike Island.
—	—	—	—	—	—	—	—	" to Queenstown.
—	—	—	—	—	—	—	—	" to Waterford.
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	—	Aghada Pier to Cork.
—	—	—	—	—	—	—	—	Belfast "
—	—	—	—	—	—	—	—	Spike Island "
—	—	—	—	—	—	—	—	Queenstown "
—	—	—	—	—	—	—	—	Waterford "
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	—	Waterford to Ballyhack.
—	—	—	1	1	—	—	1	" to Belfast.
—	—	—	1	1	—	—	34	" to Duncannon.
—	—	—	2	2	—	—	35	Total.
—	—	—	—	—	—	—	79	Ballyhack to Waterford.
—	—	1	—	1	—	—	653	Dublin to Belfast.
—	—	—	—	—	—	—	421	Duncannon to Waterford.
—	—	—	—	—	—	—	564	Kilrush to Limerick.
—	—	—	—	—	—	—	—	Kildysart "
—	—	—	—	—	—	—	—	Glin "
—	—	—	—	—	—	—	—	Portumna "
—	—	—	—	—	—	—	—	Tarbert "
—	—	—	—	—	—	—	—	Kilkee "
—	—	—	—	—	—	—	564	Total.
—	—	—	—	—	—	—	—	Milford to Portrush.
—	—	—	—	—	—	—	7	Belfast to Dublin.
—	—	—	—	—	—	—	—	Londonderry to Mulroy
—	—	—	—	—	—	—	10	Moville to Londonderry.
—	—	—	—	—	—	—	—	Ballina to Sligo.
—	—	—	—	—	—	—	933	Belmullet "
—	—	—	—	—	—	—	—	Westport "
—	—	—	—	—	—	—	933	Total.
—	—	—	—	—	—	—	—	Sligo to Ballina
—	—	—	—	—	—	—	—	Milford to Mulroy.
—	—	—	—	—	—	—	—	Mulroy to Milford.
—	—	—	—	—	—	—	—	Dublin to Waterford.
—	—	—	—	—	—	—	—	Leitbeg to Mulroy.
—	—	1	2	3	—	—	2,702	Total

RETURN of the NUMBER of HORSES EXPORTED from IRELAND through GREAT BRITAIN to the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 31ST MARCH, 1915, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, ...	—	—	—	—
Cork, ...	—	—	—	—
Dublin, ...	—	—	—	—
Dundalk, ...	—	—	—	—
Greenore, ...	—	—	—	—
Waterford, ...	—	—	—	—
Wexford, ...	—	—	—	—
Total, ...	—	—	—	—

RETURN of the NUMBER of HORSES IMPORTED into IRELAND through GREAT BRITAIN from the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 31ST MARCH, 1915, showing the Ports of Debarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, ...	—	—	—	—
Dublin, ...	—	—	—	—
Total, ...	—	—	—	—

RETURN of the NUMBER of HORSES EXPORTED from IRELAND direct to FOREIGN COUNTRIES during the THREE MONTHS ended 31ST MARCH, 1915, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Cork, ...	—	—	—	—
Limerick, ...	—	—	—	—
Total, ...	—	—	—	—

DISEASES OF ANIMALS IN IRELAND.

NUMBER OF OUTBREAKS of SWINE FEVER, and NUMBER of SWINE returned as having been SLAUGHTERED in Ireland, under the Diseases of Animals Act of 1894, in the undermentioned period, by Order of the Department.

Quarter ended	Swine Fever.	
	Outbreaks confirmed.	Swine Slaughtered as Diseased or as having been Exposed to Infection.
31st March, 1915, ...	75	439

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been Attacked by ANTHRAX, GLANDERS and FOOT AND MOUTH DISEASE in Ireland in the undermentioned period.

Quarter ended	Anthrax.		Glanders (including Farcy).		Foot and Mouth Disease	
	Outbreaks Reported	Animals Attacked.	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.
31st March, 1915,	1	1	1	3	—	—

NUMBER of CASES of RABIES in DOGS in IRELAND during the undermentioned period.

Quarter ended	Number of Cases.
31st March, 1915, ...	—

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been attacked by SHEEP-SCAB and PARASITIC-MANGE in Ireland in the undermentioned period.

Quarter ended	Sheep-Scab.		Parasitic-Mange.	
	Outbreaks Reported.	Sheep Attacked.	Outbreaks Reported.	Animals Attacked.
31st March, 1915,	180	1,236	13	17

Veterinary Branch,
Department of Agriculture and Technical Instruction
for Ireland, Dublin.

ACCOUNT showing the QUANTITIES of certain kinds of AGRICULTURAL
into Ireland during each WEEK

ARTICLES	WEEK ENDED 2nd January	9th January	16th January	23rd January	30th January
ANIMALS LIVING—					
Horses, ... No.	—	—	—	—	—
FRESH MEAT—					
Beef (including refrigerated and frozen), ... cwts.	—	—	—	—	—
Mutton, „ „ „ „	—	—	—	—	—
Pork, „ „ „ „	—	—	—	—	—
Unenumerated, „ „ „	—	—	—	—	—
SALTED OR PRESERVED MEAT—					
Bacon, ... cwts.	—	—	—	—	—
Beef, ... „	—	—	—	—	—
Hams, ... „	—	—	—	—	—
Pork, ... „	—	—	—	—	—
Meat, unenumerated, Salted „	—	—	—	—	—
Meat, preserved otherwise than by salting (including tinned and canned), ... cwts.	—	—	—	—	—
DAIRY PRODUCE AND SUBSTITUTES—					
Butter, ... cwts.	—	—	—	—	—
Margarine, ... „	—	231	—	—	182
Cheese, ... „	—	—	461	—	—
Milk, Condensed, . . . „	54	25	—	—	—
„ Cream, ... „	—	—	—	—	—
„ Preserved, other kinds „	—	—	—	—	—
EGGS, ... gt. hunds.	—	—	—	—	—
LARD, ... cwts.	—	—	—	—	—
CORN, GRAIN, MEAL AND FLOUR—					
Wheat, ... cwts.	—	269,500	183,200	64,200	79,500
Wheat, Meal and Flour, . „	21,900	85,800	11,300	20,100	41,400
Barley, ... „	—	8,600	—	—	—
Oats, ... „	—	2,000	—	—	—
Peas, ... „	—	—	—	—	—
Beans, ... „	—	—	—	—	—
Maize, or Indian Corn, . „	87,500	282,300	293,700	209,200	369,300
FRUIT, RAW—					
Apples, ... „	—	252	—	—	—
Currants, ... „	—	—	—	—	—
Gooseberries, ... „	—	—	—	—	—
Pears, ... „	—	—	—	—	—
Plums, ... „	—	—	—	—	—
Grapes, ... „	—	—	—	—	—
Lemons, ... „	—	—	—	—	—
Oranges, ... „	—	—	—	—	—
Strawberries, ... „	—	—	—	—	—
Unenumerated, ... „	—	—	—	—	—
HAY, ... tons,	—	—	—	—	—
STRAW, ... „	—	—	—	—	—
MOSS LITTER, ... „	—	—	—	—	—
HOPS, ... cwts.	—	—	—	—	—
VEGETABLES, RAW—					
Onions, ... bushels,	—	790	24	—	—
Potatoes, ... cwts.	—	—	—	—	—
Tomatoes, ... „	—	—	—	—	—
Unenumerated, . . . value £	—	4	—	—	—
VEGETABLES, DRIED, . . . cwts.	—	—	—	—	—
Preserved by Canning, . . „	—	—	—	—	—
POULTRY AND GAME, . value £	—	—	—	—	—

*This Table is confined to the Imports of certain kinds of Agricultural Produce into
to a request from this Department kindly consented to separate the Irish Imports (direct)
form of Weekly Returns.

Produce imported direct (i.e., from the Colonies and Foreign Countries) of January, February, and March, 1915.*

Week Ended							
6th February	13th February	20th February	27th February	6th March	13th March	20th March	27th March
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
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—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
300	120	—	161	198	—	219	360
77	—	341	—	—	—	—	—
—	—	—	39	—	16	122	21
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
46,800	187,300	55,700	—	21,000	264,100	—	1,500
49,700	600	46,900	—	35,900	74,300	20,100	25,700
—	—	58,700	—	75,600	5,400	—	—
—	—	5,400	—	—	122,600	—	11,300
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
194,000	374,700	211,100	329,300	235,000	480,200	148,300	268,100
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
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—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
1,346	680	—	—	—	—	—	200
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	6	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—

Ireland from the Colonies and Foreign Countries. The Board of Customs have in answer from those of the United Kingdom, and to supply this Department with them in the

Statistics and Intelligence Branch,
Department of Agriculture
and Technical Instruction for Ireland.

[OFFICIAL COPY]

Vol. XV. **No. 4.**

DEPARTMENT OF AGRICULTURE

AND

TECHNICAL INSTRUCTION FOR IRELAND.

JOURNAL.

The Council of Agriculture—The Vice-President's Address—Cheese-making in Ireland—Reclamation of Bog Land—Crop Report, Mid-July, 1915—Fruit Crop Report, Mid-July, 1915—Potato Blight in Ireland, 1915—Third Irish Egg-Laying Competition—Use and Purchase of Feeding Stuffs—Breeding and Feeding of Pigs—Advice to Pig Feeders—Official Documents—Notes and Memoranda—Statistical Tables.

FIFTEENTH YEAR

No. 4

JULY, 1915.

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1915.

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CONTENTS.

NOTICE.

Communications respecting the literary contents of this JOURNAL *should be addressed to the Superintendent of the Statistics and Intelligence Branch, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin.*

Communications respecting advertisements should be addressed to ALEX. THOM & CO. (LIMITED), MIDDLE ABBEY STREET, DUBLIN ; *or to* LAUGHTON & CO. (LIMITED), 3 WELLINGTON STREET, STRAND, LONDON, W.C., and not to the DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

THE COUNCIL OF AGRICULTURE.

The Twenty-seventh Meeting of the Council of Agriculture took place on Tuesday, 4th May, 1915, in the Lecture Theatre of the Royal Dublin Society, Leinster House, Kildare Street, Dublin (by kind permission of the Council of the Society).

The Chair was taken at 11 a.m. by the Right Hon. T. W. Russell, M.P., Vice-President of the Department.

The Right Hon. Sir Matthew Nathan, G.C.M.G., Under Secretary, occupied a seat on the platform.

The following were present:—

Representing the Department:—The Vice-President; T. P. Gill, Secretary; J. R. Campbell, B.SC., Assistant Secretary in respect of Agriculture; George Fletcher, F.G.S., Assistant Secretary in respect of Technical Instruction; J. S. Gordon, B.SC., Deputy Assistant Secretary in respect of Agriculture and Chief Agricultural Inspector; H. G. Smith, LL.D., Chief Clerk; Thomas Butler, Superintendent of the Statistics and Intelligence Branch; D. S. Prentice, M.R.C.V.S., Chief Veterinary Inspector; J. P. Walsh, Clerk in Charge of Accounts; Charles Green, B.A., Inspector of Fisheries; J. V. Coyle, B.L., Senior Staff Officer; F. J. Meyrick, M.A.; A. Kelly; John Hooper, B.A.; W. Bowers; M. Deegan, and J. T. Lennon.

Members of Council, according to Provinces.

LEINSTER.

James J. Aird, J.P.; John Bolger, J.P.; Algernon T. F. Briscoe, J.P.; Patrick J. Carey, J.P.; Denis J. Cogan; James Conroy; James G. Dooley; Robert Downes; Michael Dunne, J.P.; Rev. Thomas A. Finlay, M.A.; Patrick Hanlon; Michael J. Horan, J.P.; Patrick J. Kennedy, J.P.; James M'Carthy, J.P.; George F. Murphy, J.P.; Patrick J. O'Neill, J.P.; Charles H. Peacocke, J.P.; Henry Reynolds; William R. Ronaldson, J.P.; George Wolfe, J.P.

ULSTER.

Anthony Cassidy, J.P.; Alexander L. Clark, J.P.; Frederick C. Cowdy; Joseph Davison; James Hill Dickson, J.P.; Edward Gallagher, J.P.; William Gallagher, J.P.; John Keenan, J.P.; Thomas Macafee, J.P.; John S. F. M'Cance, J.P.; Thomas A. M'Clure, J.P.; Thomas P. M'Kenna, J.P.; Hugh de F. Montgomery, J.P., D.L.; George Murnaghan, J.P.; John Porter Porter, J.P., D.L.; Colonel Robert G. Sharman-Crawford, J.P., D.L., M.P.; Michael Sheils, J.P.; Alfred H. Sinton; Thomas Toal, J.P.; Rev. Lorcan Ua Ciarain, P.P.

MUNSTER.

John Bourke; Edmund Cummins, J.P.; Thomas Duggan, J.P.; Joseph Dwyer, J.P.; William R. Gubbins, J.P.; William M'Donald, J.P.; Michael Mescal, J.P.; Patrick Moclair, J.P.; The Right Hon. Lord Monteagle, K.P., D.L.; Michael J. Nolan, J.P.; Edmond Nugent, J.P.; David Leo O'Gorman, J.P.; Stephen O'Mara; Hugh P. Ryan; Timothy Sheehy, J.P.; Michael Slattery, J.P.; James Willington, J.P.

CONNACHT.

Patrick D. Conroy, J.P.; Patrick J. Costello, J.P.; Rev. Joseph G. Digges, M.A.; Rev. Charles Flynn, P.P., V.F.; John Galvin; Sir Josslyn Gore-Booth, Bart., J.P., D.L.; Bernard Harte, J.P.; John Lohan; James P. MacGuire, J.P.; Rev. Patrick J. Manly, C.C.; Daniel Morrin, J.P.; Rev. Philip J. Mulligan, P.P.; Robert P. Wallace, J.P.

Mr. J. V. Coyle acted as Secretary to the Meeting.

The Minutes of the Twenty-sixth Meeting, 20th August, 1914, a copy of which had been sent to each member of the Council, were taken as read, and were signed as correct.

Apologies for inability to attend the meeting were received from the Right Hon. the Earl of Granard, K.P.; the Most Reverend Denis Kelly, D.D., Lord Bishop of Ross; Colonel Sir Nugent T. Everard, Bart., H.M.L.; Captain John E. B. Loftus, J.P.; Mr. Hugh T. Barrie, M.P.; Mr. Robert N. Boyd; Mr. Thomas J. Byrne, J.P.; Mr. Peter Ffrench, M.P.; Mr. Walter McM. Kavanagh, D.L.; Mr. Patrick O'Connell, J.P., and Captain John Patrick, J.P.

Colonel Sharman-Crawford, D.L., M.P. (Co. Down), asked leave to make a proposal which would shorten the proceedings. In view of the conditions at present prevailing contests were being avoided as far as possible and he accordingly suggested that all the old members of the Agricultural Board and of the Board of Technical Instruction should be re-elected without going through the formality of separate election by Provincial Committees.

Mr. H. de F. Montgomery, D.L., supported the suggestion.

The Vice-President stated that the statute required the Provincial Committees to meet in order to make the appointments in question. These Committees, however, would probably note Colonel Sharman-Crawford's suggestion.

The Vice-President delivered his address (see pp. 684 *et seq.*).

The Vice-President said that he had received from a member of the Council verbal notice of his desire to move a resolution in reference to the additional duties on beer and spirits recently announced by the Chancellor of the Exchequer. The Standing Orders required that seven days' notice should be given of any notice of motion intended for submission to the Council. If, however, the Council

regarded the matter as urgent he was willing to take the motion after the luncheon interval. It would be necessary, however, for the member to whom he alluded (Mr. Horan) to hand in a notice in writing. He left the matter in the hands of the Council.

Several members protested against the acceptance of the proposed notice of motion, and on taking a show of hands the Vice-President announced that 20 members were in favour of the notice being accepted and 28 members were against it. The decision of the Council accordingly was that the question should not be discussed.

The Vice-President refused Mr. Horan's request for a poll of the meeting, as the question was one of procedure.

The Council resolved itself into Provincial Committees for the purpose of electing members on the Agricultural Board and on the Board of Technical Instruction.

The Council re-assembled at 1.20 p.m.

The Vice-President announced the result of the elections to the Boards as follows :—

AGRICULTURAL BOARD.

Leinster.—Mr. Patrick J. O'Neill, J.P. ; Mr. Robert Downes.
Ulster.—Mr. John S. F. McCance, J.P. ; Mr. George Murnaghan, J.P.
Munster.—Most Rev. Denis Kelly, D.D., Lord Bishop of Ross ; Mr. John Bourke.
Connacht.—Rev. Charles Flynn, P.P., V.F. ; Mr. John D. O'Farrell.

BOARD OF TECHNICAL INSTRUCTION.

Leinster.—Rev. Thomas A. Finlay, M.A.
Ulster.—Mr. Frank Barbour.
Munster.—Mr. Thomas Power.
Connacht.—Most Rev. Thomas O'Dea, D.D., Lord Bishop of Galway.

The Vice-President stated that the following were nominated by the Department as members of the Agricultural Board :—

Leinster.—Colonel Sir Nugent T. Everard, Bart., H.M.L.
Ulster.—Mr. Alexander L. Clark, J.P.
Munster.—Alderman Henry Dale, J.P.
Connacht.—Sir Josslyn Gore-Booth, Bart., D.L.

The Vice-President stated that the following were nominated by the Department as members of the Board of Technical Instruction :—

Leinster.—Professor John A. McClelland, M.A., D.SC., F.R.S.
Ulster.—Alderman William J. Moore, J.P.
Munster.—Mr. Christopher J. Dunn, J.P.
Connacht.—Very Rev. James Canon Daly, D.D.

The Council proceeded to consider the following resolution adopted by the Department's Advisory Sub-Committee on Horse-breeding at their meeting on 26th June, 1914, which was submitted by the Department for discussion :—

> "That the Advisory Committee, after inspecting the Irish Draught Colts purchased by the Department, and having heard the report of the Inspector on those rejected, are of opinion that the scheme, with the materials available, is not likely to achieve the results hoped for, and recommend that the funds now spent on this scheme be, as soon as practicable, applied to the use of pure-bred sires."

Mr. Campbell read a statement detailing the various steps taken by the Department in connection with the Irish Draught Horse from the time it was first brought to the notice of the Department.

The subject was discussed at considerable length and ultimately the Council concurred in the views expressed in the above resolution.

Mr. Patrick J. O'Neill, J.P. (Co. Dublin), called attention to the danger arising from the unrestricted exportation from Ireland of certain classes of live stock, and moved :—

> "That this Council is of opinion that any abnormal depletion of the breeding stock of this country is a serious menace to the agricultural interests of Ireland in the future and calls upon the Department to exercise the utmost vigilance in restricting such a wasteful and uneconomic policy."

The resolution was seconded by Mr. Michael Dunne, J.P. (Co. Dublin).

The Vice-President stated that at present there was no need for alarm, but the Department would continue to give the matter their earnest attention.

The resolution was adopted unanimously.

Mr. Robert Downes (Co. Westmeath) raised the question of the desirability or otherwise of allowing into Ireland mares returned by the Army Authorities. Many local bodies in the country were unaware of the reasons which the Department had for opposing the importation of these animals.

At the request of the Vice-President the Chief Veterinary Inspector made a brief statement. After the South African war when many Army horses were brought to this country glanders and epizootic lymphangitis broke out in the South of Ireland. It took the Department three years from that time to clear the country of these diseases. That experience induced the Department to oppose a suggestion to place out with farmers in Ireland any horses returned from the present war. Epizootic lymphangitis and other

serious diseases, which so far had not occurred in Ireland, at present prevailed in many of the countries from which army horses were brought. There was no reliable test for epizootic lymphangitis, the period of incubation for which extended over from six to eight months.

It was the case that the military authorities had brought from various places abroad horses and mules into this country, but these authorities kept all such animals under their own control and supervision and had undertaken not to allow any of them to be sold to a civilian.

The Council approved of the action taken by the Department.

The following resolution standing in the name of Mr. William Field, M.P., was moved by Mr. Michael Dunne, J.P. (Co. Dublin), and seconded by Colonel Sharman-Crawford, D.L., M.P. (Co. Down):

> "That this Council is of opinion that the Department should make such regulations or orders as may be necessary to make it obligatory on every Council in Ireland that sheep-dipping should be carried out under proper supervision with the object of preventing diseased sheep being allowed to enter this and other counties where everything possible is being done by the County Council to prevent the disease in their county."

It was suggested (Mr. P. J. Kennedy, J.P., and others) that the police should be employed to carry out the work of inspection.

After considerable discussion the Vice-President stated that up to the present the police authorities were not disposed to consent to undertake the work. If, however, the several County Councils did their duty by complying with the law he would be prepared to take up the question again with the police authorities. The Department would feel bound to inform the recalcitrant local bodies that they would seek for a mandamus to compel these bodies to put the law into operation, and he gathered from the discussion which had taken place that the Council approved of this course.

The resolution was adopted unanimously.

Mr. James McCarthy, J.P. (Co. Louth), stated that in accordance with his notice of motion he had intended to call attention to the continued sale of inferior seeds and feeding-stuffs in Ireland, but as the matter had been dealt with very fully in the Vice-President's address he would content himself by expressing the hope that the Department would continue unabated their efforts to put down the sale of such commodities in Ireland.

The following resolution standing in the name of Mr. Thomas J. Byrne, J.P. (Co. Louth), was not moved, Mr. Byrne being unavoidably prevented from attending the meeting :—

> "That we request the Department of Agriculture to obtain,

publish and circulate weekly reports of the current prices of cereals, roots, hay and straw at the time prevailing in the principal markets of the United Kingdom."

The following resolutions standing in the name of Mr. Patrick Crumley, J.P., M.P. (Co. Fermanagh), were not moved, Mr. Crumley being detained in London by Parliamentary duties :—

(i.) To call the attention of the Vice-President of the Department of Agriculture to the very high charges for what is called "mouthing cattle" made at the different ports in Ireland, the charges at present being *2d.* per head ; and to the desirability of permitting owners to take charge of their live stock from the railway station to the steamer, whereby extra expense to the owners would be avoided.

(ii.) "That the Department be requested to reduce the time of detention of live stock at Irish Ports from two hours to one hour."

(iii.) "That we ask the Board of Agriculture for Great Britain to reduce the time of detention at the Port of Debarkation of store cattle from ten hours to five hours, and, in the case of fat sheep, lambs, and pigs, from ten hours to two."

Rev. J. G. Digges, M.A. (Co. Leitrim), asked whether the Department would use their influence to procure for honey producers at home some share of the Government's patronage in the matter of the supply of honey to the Army, sixteen tons of Australian honey having been recently purchased for the troops at the front. The Authorities required 100,000 lbs. of honey for their Indian and other troops.

Mr. Gill stated that the Department had been and were still giving attention to this question. Some time ago the Department's Marketing Section brought the matter under the notice of some of the largest shippers of Irish honey. There were, it was understood, considerable quantities of Irish honey available for this purpose and the principal matter to be settled was the question of price.

Rev. J. G. Digges, M.A. (Co. Leitrim), inquired whether the Department had arrived at any decision with respect to (*a*) the recommendation of the majority of the Departmental Committee on Agricultural Credit in Ireland, viz. :—that the inspection and supervision of credit societies should be undertaken by the Department of Agriculture ; and (*b*) the Committee's statement, as follows:— "If there has been one aspect of the Co-operative credit movement which more than any other has impressed itself upon the attention of the Committee it is the paramount importance of an effective and regular system of inspection and audit of the societies."

He would suggest that the Department should arrange to make surprise inspections of these Societies.

The Vice-President stated that the Department disclaimed any responsibility for existing credit societies. The loans advanced by the Department some years ago were being recalled from the 64 societies which had not repaid the money by the end of last year. The present was not an opportune time for taking action on the Departmental Committee's report, but on the termination of the war the Department would take the matter in hands.

Mr. James J. Aird, J.P. (Queen's Co.), moved the following resolution, which was seconded by Mr. W. R. Ronaldson, J.P. (Co. Kildare):

> "That this Council requests the Department to sanction the registration of Shire and Clydesdale sires in the Queen's County, so that their services may be available through the county agricultural scheme 1915-16."

After some discussion the question was put. On a division there voted :—

For the resolution	15
Against	8
Majority for	7

The voting on the resolution was as follows :—

For.

Leinster.—James J. Aird, J.P.; James Conroy; Robert Downes; Michael Dunne, J.P.; Patrick J. Kennedy, J.P.; Patrick J. O'Neill, J.P.; William R. Ronaldson, J.P. *Ulster.*—Anthony Cassidy, J.P.; James Hill Dickson, J.P.; Thomas A. McClure, J.P.; Alfred H. Sinton; Thomas Toal, J.P.; Rev. Lorcan Ua Ciarain, P.P. *Munster.*—Joseph Dwyer, J.P. *Connacht.*—John Lohan (15).

Against.

Leinster.—Michael J. Horan, J.P. *Ulster.*—Alexander L. Clark, J.P.; John Keenan, J.P. *Munster.*—Hugh P. Ryan. *Connacht.*—Rev. Joseph G. Digges, M.A.; John Galvin; Sir Josslyn Gore-Booth, Bart., J.P., D.L.; James P. MacGuire, J.P. (8).

Mr. Patrick Hanlon did not vote.

The proceedings terminated at 5.30 p.m.

THE VICE-PRESIDENT'S ADDRESS.

My Lords and Gentlemen,

The Council of Agriculture which meets to-day is technically a new body. It is constituted by statute, holds office for a period of three years, and consists of 104 members, two of whom—the President and Vice-President of the Department—are *ex-officio* members, sixty-eight are elected by the County Councils, and thirty-four are nominated by the Department. From a rough analysis it would appear that between seventy and eighty of the members are either farmers or are closely connected with the farming industry; the others having been either elected or nominated because of their identification with agricultural and industrial interests throughout the country. In selecting the nominated members there is a statutory obligation upon the Department to take other interests as well as those of agriculture into consideration. The changes that have taken place in the personnel of the Council on this occasion are fairly numerous, but they have been effected mainly by the County Councils. There are only five new names in the list of nominated members, and two of these changes were necessitated by the retirement of former members owing to age and infirmity. I make these facts clear because of some loose and ill-informed criticism in letters which have appeared in the public press, and I have only to add that so far as the Department are concerned the spirit and the letter of the Statute governing the constitution of the Council have alike been complied with. The same thing can, in my opinion, be said of the action of the County Councils in this connection.

The Finance of the Department.

Before I deal with a few particular branches of work which call for mention, I have something to say about the financial position of the Department.

The widespread superstition that we were in possession of a gold mine has been rudely dissipated during the past year. I remember a notice of motion in the House of Commons to seize for Arterial Drainage £100,000 from the Department's alleged surplus. Every Department of State, except of course the Service Departments, has, as a result of the war, been called upon by the Treasury to exercise exceptional foresight and economy. Apart, however, from the economies which have been effected in connection with the moneys voted annually by Parliament for the service of the Department, I propose at the next meeting of the Agricultural Board, to submit estimates reducing the annual expenditure out of the Department's Endowment Fund by some £31,000. This reduction is due to two

causes—the great fall in the value of securities held by the Department and from which part of their income is drawn, and the fact that in several branches of work the expenditure has outrun the available funds. However good this work may have been—and in my opinion it has been truly beneficent—there is no option but to retrench, and to apply the pruning knife somewhat ruthlessly. This means that a reduction in the grants made to County Committees and in the expenditure upon work done directly by the Department has become absolutely imperative. But I trust that some, at least, of these reductions will be temporary only, and that an early resumption of the work thus curtailed will be practicable.

The Agricultural Income of Ireland.

In view of the importance of the food supply and its development at the present juncture, and as I am in a position for the first time to utilise the figures derived from the Census of Production, I have thought this an opportune occasion for analysing some of the constituent figures of the Agricultural Income of Ireland, which for 1912-13 was estimated at £56,309,000. Of this sum no less than £25,614,000, or 45·5 per cent., was received in respect of butter, milk, pigs, eggs, and poultry. The value and percentage of the total income from each of these products were :—

	Value.	Percentage of Farmer's Income.
	£	
Butter	9,201,000	16·3
Milk (consumed as such)	2,736,000	4·9
Total Butter and Milk	11,937,000	21·2
Pigs	7,790,000	13·8
Eggs	4,312,000	7·7
Poultry	1,575,000	2·8
Total Eggs and Poultry	5,887,000	10·5
Total Butter, Milk, Pigs, Eggs, and Poultry.	25,614,000	45·5

This £25,614,000 includes the produce consumed by Irish farmers and their families, and represents the income which they derive from what have been termed " breakfast table commodities." Before these commodities reach our tables, or our ports for shipment to Great Britain, their cash value is, of course, largely increased by the bacon curers, the merchants, the railway companies, and all the other factors which constitute the machinery of distribution. More than half of them is consumed in Ireland. We consume about

57 per cent. of the butter, practically all the milk, 37 per cent. of the pigs, 59 per cent. of the poultry, and 33 per cent. of the eggs. The remainder is exported to Great Britain.

The estimated value of the exports from Ireland of Butter, Eggs, Poultry, Live Pigs, Bacon and Hams in each of the last five years was :—

——	1910.	1911.	1912.	1913.	1914.
	£	£	£	£	£
Butter	3,585,000	3,671,000	4,160,000	3,736,000	4,645,000
Eggs	2,744,000	2,940,000	2,927,000	3,019,000	3,384,000
Poultry	927,000	851,000	1,038,000	986,000	1,071,000
Total Eggs and Poultry.	3,671,000	3,791,000	3,965,000	4,005,000	4,455,000
Live Pigs ..	1,332,000	1,332,000	1,302,000	1,024,000	737,000
Bacon and Hams ..	3,692,000	3,494,000	4,220,000	4,209,000	4,063,000
Total Live Pigs, Bacon and Hams	5,024,000	4,826,000	5,522,000	5,233,000	4,800,000
Total Butter, Eggs, Poultry, Pigs and Pig Products.	12,280,000	12,288,000	13,647,000	12,974,000	13,900,000

Some Interesting Comparisons.

The fourteen million pounds sterling that Ireland thus receives for her breakfast table commodities at first sight appears a very respectable figure. It certainly is a very interesting one. But, after all, what does it amount to ? Our surplus for export, after providing for home consumption, should be at least doubled. And this we could do for each item—our home consumption remaining the same —by providing 12 cows, 13 pigs, and 237 poultry to the 100 acres of productive land, the stock being no better or no worse than we have now. At present we have only 9 cows, 8 pigs, and 148 poultry to the 100 acres. One wearies of holding up the people of other wiser, if not happier, lands to show what is possible—Denmark, with 14 cows, 27 pigs, and 167 poultry to the 100 acres ; Holland, with 15 cows, 19 pigs, but only 99 poultry, and so on. But there is much to be learned from *what our own small farmers are doing*. Irish farmers with 30 acres or less have as many as 15 cows, 15 pigs, and 366 poultry to the 100 acres of cropped and pasture lands, whereas our farmers with 100 acres or more have only 6 cows, 3 pigs, and 52 poultry. It may be objected that we might double the surplus of breakfast table commodities only at the expense of our cattle trade. Not at all. The small farmers, in addition to having two-and-a-half times as many cows, five times as many pigs, and seven times as many poultry

to the 100 acres as the large farmers, hold exactly the same number of other cattle, viz., 23 to the 100 acres.

Someone may perhaps raise the point that these 23 other cattle on the small farms are younger and less valuable animals that require less food than the 23 on the large farms, and also that there are 36 sheep per 100 acres on the large farms to 19 on the small farms. This is quite true, but, then, look at the contrast in cows, pigs, and poultry. I should explain that the figures I have given show the large farmer in the most favourable light possible, as the two-and-a-half million acres of rough grazed mountain lands, most of which are on the large holdings, have been left out of account in calculating the number of stock. In addition, it should be borne in mind that I am not contending that the large farmers should have as many cows, pigs, and poultry to the 100 acres as the small farmers, nor that Ireland should have as many as Denmark or Holland; but I maintain that we should carry enough to permit us to double our export.

Again, it may be contended that farms with 30 acres or less are too small for purposes of comparison. Well, let us contrast farms under 50 acres and farms over 50 acres. The former carry 14 cows, 14 pigs, and 295 poultry to the 100 acres, whereas the latter have only 8 cows, 5 pigs, and 80 poultry. The former carry 23 other cattle and 19 sheep, the latter 23 other cattle and 31 sheep.

These contrasts, of course, get us back to the tillage question: the farmers with 30 acres or less have under crops 44 per cent., the farmers of over 100 acres only 22 per cent. of their cropped and pasture lands.

Animal Population and Capital Values.

Our cows and poultry are increasing, but much too slowly. The cows have increased by only 6 per cent. and the poultry by 12 per cent. in the last five years. The numbers of our pigs fluctuate greatly and rapidly, going up one year and down the next, but the general tendency appears to be downwards. The average number on the 1st June of the four years 1900 to 1903 was 1,300,000; for 1904–1907, 1,260,000; for 1908–1911, 1,246,000; and for 1912, 1913 and 1914, 1,230,000.

The capital value of the milch cows, pigs and poultry in Ireland on the 1st June, 1912, was £23,200,000, and the farmer's income from butter, milk, pigs, eggs, and poultry in the following twelve months was £25,600,000, or 110 per cent. of the capital value. The capital value of cattle other than milch cows was £25,000,000, and the income from fat and store cattle only £13,100,000, or 52 per cent. of the capital value. The capital value of sheep was £5,400,000 and the income £3,500,000, or 65 per cent.

A Satisfactory Investment.

If pigs and poultry alone are considered, the capital value was only £4,700,000, whereas the income was £13,700,000, or 283 per cent. of the capital. Would it not be to our advantage to develop this safe business of "breakfast table commodities," which brings in such lucrative returns from a comparatively small outlay? Great Britain can take all the butter, eggs, poultry, live pigs and bacon and hams we can supply. In 1913, in addition to paying Ireland £13,000,000 for these commodities, she paid foreign countries £55,000,000, and also paid her own producers something like £26,000,000, making a total payment of £94,000,000. Of this £94,000,000, producers in Great Britain received 27·7 per cent., Denmark 23·2 per cent., Ireland 13·8 per cent., Russia 10·2 per cent., the United States of America 9·6 per cent., and all other countries 15·5 per cent. In 1913 Ireland received only £3,736,000 for her butter, whereas Denmark took £10,658,000 and Russia £3,831,000. As regards eggs, Ireland received £3,019,000, Russia £4,745,000, and Denmark £2,297,000. For live pigs, bacon and hams Ireland got only £5,233,000, while Denmark got £8,870,000 and the United States £8,838,000.

And not only are we not taking advantage of this huge market at our doors, but we are actually allowing the foreigner to supply some of our own immediate wants in connection with these particular commodities. Ireland imported butter, eggs, poultry, bacon and hams to the value of £2,580,000 in 1914, and £2,650,000 in 1913. The imports of bacon and hams amounted to £2,059,000 in 1914 and £2,133,000 in 1913. The butter imported was valued at £466,000 in 1914 and £455,000 in 1913.

The Question of Tillage.

At the last meeting of the Council a discussion in regard to tillage took place, and a resolution was passed strongly urging farmers to enlarge their tillage operations. A valuable address was delivered by his Lordship, the Bishop of Ross, who moved a resolution on the subject, of which address, together with Mr. Campbell's paper read on the same occasion, the Department circulated 100,000 copies. All the machinery of the Department, including the County Committees, the Department's Inspectors, and the Agricultural Instructors and Overseers, was set in motion with a view to bringing about an organised effort to increase the food supply by an extension of tillage. The Agricultural Instructors throughout the country were summoned to Dublin, their duty in this matter was pressed upon them personally and every endeavour was made to see that the resolution of the Council was promptly and efficiently carried into effect. No definite figures in regard to the consequent increase in

tillage and catch crops can yet be given. It will be July* or the beginning of August before the returns can be collected and tabulated. But the information obtained by the Department as a result of preliminary inquiries conducted all over the country indicates that the advice thus given has been very largely acted upon by the farmers.

SHORTAGE OF AGRICULTURAL LABOUR.

And here I wish to strike a warning note. We have in the past experienced the grave inconvenience of a shortage of agricultural labour at certain seasons of the year. This is in face of the fact that thousands of our people go annually to England and Scotland for work in connection with the harvest. There was a time when the number of migratory labourers who undertook this pilgrimage was much larger than it has been of late years. Recent land legislation, including the resettlement of the Congested Districts, and the institution of a system of agricultural education and development, have tended to diminish this periodic exodus, which last year fell to 13,000 as compared with 26,000 ten years ago. The diminution has not, however, for various reasons, eased the shortage referred to, and along with an increased demand for labour, there will in every probability be a still smaller supply in Ireland this year. It is well known that there will also be an exceptional shortage in England and Scotland, and the farmers there are already endeavouring to engage workers in advance. But there is another factor which must be taken into account. The drain of the war has told upon the whole industrial community, and the Department have been officially informed that certain British firms engaged in the production of war material have had representatives in Ireland offering very large prospective wages to the Irish labourer with a view to inducing him to travel to Great Britain and undertake this important branch of work. I do not know what success has attended these recruiting operations, but it is well that those farmers in Ireland who employ labour during the harvest should be apprised of the facts, and that they should seek to make provision for a difficulty that is certain to arise.

THE DEPARTMENT AND OTHER ORGANISATIONS.

Some strictures have appeared in certain quarters upon the Department because of their alleged failure to seek co-operation with exterior agencies in the matter of developing tillage. I refer to this subject with extreme reluctance. The machinery and operations of the Department extend over the entire country and affect every class of farmer, whether they be co-operative or individualist. I have acted throughout the whole term of my office on the principle that the Department should do their own work. If there be those who do

* *See "Special Preliminary Statement" on pp.* 806, 807

not wish to co-operate with the Department in this or any other form of agricultural work, I regret it. But they are at perfect liberty to choose their own path, and they have done so. They may teach agriculturists to co-operate in the sale of agricultural implements or of anything else. They may seek by the combination of agriculturists to facilitate the breaking up of land and the sowing of crops where cattle are now raised. In any such sphere of effort the Department can only wish them the measure of success which they deserve. But the supplying of expert agricultural advice by the agents of a certain body which receives State funds for other purposes constitutes a most undesirable overlapping of functions with those of the State Department of Agriculture—an overlapping which to my knowledge is the cause of much natural confusion in the minds of the small farmers in many places.

If the complaint be as stated, viz., that the Department, or I myself as Vice-President—for the assurance has gone forth from the same hostile quarters that I have not the support of most of my colleagues, and that I only hold on to my policy because of the tyranny of the Irish Nationalists—if the complaint be that the Department or I myself do not choose to turn aside from the real and successful work which we have in hand, and to assume responsibility for, or to give an appearance of authority to, the work of other organisations, well, I am in no way concerned to disown the charge. My particular business is to see that the work of the Department is wisely planned and well executed, and it is scarcely blameworthy on my part to refuse either to assume responsibility for, or to countenance identification with, agencies over whose actions neither I nor the Department exercise, or desire to exercise, an atom of control.

The Supply of Flax Seed.

I now come to the flax industry, which has occupied a good deal of public attention for some months past. In anticipation that the imports of flax seed from Holland and Russia would be seriously interrupted, the Department, on the outbreak of war, lost no time in advising Irish growers to save a portion of their own flax crop for seed purposes. As flax pulling operations were then in an advanced stage, only a limited number of growers were in a position to act on this advice. It is impossible to form an accurate estimate of the quantity of Irish seed that was saved, but it is estimated that the amount was probably not more than would provide for sowing an area of 2,000 acres. An exceptionally large supply of seed, approximately 22,000 bags, has been obtained from Holland this season. This is about double the quantity received from the same source in 1914. The Dutch Government placed an embargo on the export of flax seed in December, but this was done with a view to securing a sufficient supply for their own farmers, and it does not appear to have reduced

the amount that was eventually shipped to this country. The importation of seed from Russia was attended by very serious difficulties and expense owing to the impossibility of carrying it by the usual shipping routes direct from Riga and Pernau through the Baltic Sea. In the early part of the season the Russian Government prohibited its export, but towards the end of December several importers made application to the Department, and, through the intervention of the British Foreign Office, obtained permission to ship seed from Russia to this country. These importers succeeded in landing 2,800 bags of seed in Belfast early in April. The Flax Spinners' Association, in view of the difficulties which prevented the market from being fully supplied by the usual importers as in other years, with great public spirit and enterprise purchased in Russia 12,000 bags of seed. The British Foreign Office have given them every possible assistance in the way of their obtaining the necessary transport facilities, but, even with this help, the difficulties and cost of transport have been very great, and the seed has only begun to arrive within the last few weeks. The total quantity of Russian seed that has reached this country up to the 1st May has been 9,000 bags. Small supplies of seed have also been imported from England, Canada, and France; and altogether the total quantity of seed now available is sufficient for sowing an area of 66,000 acres.

Prospects of the Flax Industry.

The prices obtained for flax by Irish growers during the past season were amongst the highest on record. They ranged from 9*s*. to 20*s*. per stone, the average being approximately 14*s*. These prices represent a rise of about 100 per cent. on those of the preceding year which varied from 5*s*. to 11*s*. per stone, the average being about 7*s*. The highest average price for any one year from 1847 up to the previous season was 13*s*. 3*d*. per stone, in 1865, while the lowest was 4*s*. 8*d*., in 1894. The yield of flax last season was rather low, but the crop was very remunerative owing to the high prices of fibre. An average gross return of at least £17 per statute acre was obtained for the whole of the Irish crop, as compared with £12 5*s*. in the previous year. There is every likelihood of a continuance of these remunerative prices. The crop in Russia, on which our spinners are so largely dependent, was a partial failure last year, and as, with the exception of Holland, all the principal flax growing countries are actively engaged in war, there must of necessity be a large reduction in the area of flax grown and a serious curtailment of supplies next year.

The Acreage under Flax.

Unfortunately the uncertainty that existed during the past winter of a sufficient supply of seed being procured from Holland and Russia

prevented Irish farmers from being able to take full advantage of the situation by sowing a largely extended area of flax. For a similar reason the Department were unable to encourage the introduction of flax growing in new districts. The most important factor, however, in limiting the extent of this year's sowing of flax has been the serious uncertainty of a sufficient supply of suitable seed being available. In some districts where Riga seed is almost exclusively grown the area has been to some extent restricted through the growers' fears that they could not secure a good crop from Dutch seed. Otherwise as much land would have been devoted to flax as growers calculated they would be able to handle with the available supply of labour.

Another factor which influenced the farmers to limit the extent of their flax operations and to plough a larger area of lea ground than usual for oats was the high prices prevailing for the latter crop. While the high price of oats, the dearness of flax seed, and the shortage of labour tended to limit the area of flax sown, the combined effect of all these factors was less than that of the uncertainty regarding the supply of seed.

The Weeds and Agricultural Seeds Act.

The question of the supply of agricultural seeds, manures and feeding stuffs has continued to engage the close and constant attention of the Department. It was not until after I took office in 1907 that any organised legislative attempt was made to deal with the sale of inferior agricultural seeds in this country. The Weeds and Agricultural Seeds (Ireland) Act, which I was instrumental in placing upon the Statute Book in 1909, marked the first legislative attempt to deal with what had long been recognised as a gross, and indeed an intolerable, form of fraud upon the agricultural community. This enactment led to a complete reorganisation of the Department's Seed Testing Station, the establishment of a widespread system of sampling, and the formation of a special staff for dealing with the purity and germination of agricultural seeds.

I am far from saying, or even implying, that the action taken is commensurate with the necessities of the case. But I do affirm, and I call public attention to the statement, that the charges of inactivity and over-consideration for the vendors of inferior seeds, which have been levelled against the Department, are founded upon a totally and, I fear in the case of some critics, a wilfully false apprehension of the situation. Because the extreme power of "black-listing," *i.e.*, publishing by means of placards and otherwise the names of the peccant merchants concerned, which was conferred upon the Department by the Act of 1909, has not been widely exercised, but has been advisedly used as a weapon *in terrorem*, it is blazoned forth that nothing has been done. The truth is that for the five years

following the enactment of that measure the Department have, as the Council is aware, been endeavouring to overcome the effects of long continued neglect, and that what in all the circumstances may fairly be described as a gratifying improvement has taken place.

MORAL SUASION AND "BLACK-LISTING."

When the Weeds and Seeds Act was passed there was in the mind of Parliament an understanding that the drastic and novel power of "black-listing" would be used only when other means, including that of moral suasion, had been exhausted. And even in the absence of any such understanding, the wisdom of achieving by voluntary co-operation reform in a traffic which neglect, or custom if you will, had in a sense commercially legitimised, and of holding in reserve an extremely punitive power which if exercised indiscriminately would be rendered more or less inefficacious, can hardly be disputed. On a previous occasion I gave the Council an account of the conferences which had been held by the Department in Belfast, as a result of which the firms of seed cleaners from which the bulk of the supply of grass seed is either directly or indirectly derived agreed wholly to discontinue the sale, for use as agricultural seeds in Ireland, of perennial rye grasses below 20 lb. bushel weight and Italian rye grass below 16 lb. bushel weight, as well as of such mixtures as white and brown hay seed, cleanings, blowings, and holcus. The effect of this arrangement was largely to cut off the supply of those so-called agricultural seeds which had hitherto constituted the great bulk of the inferior samples of grass seeds tested at our Seed Testing Station. The arrangement has on the whole been honourably adhered to, and both the official samplers and the testing staff combine to state that its effects have been altogether beneficial.

THE SYSTEM OF SEED SAMPLING.

Undue stress has been placed upon the percentage of samples of seed which are found to be unsatisfactory, and this percentage has been held up as being representative of the entire seed supply. Now, what are the real facts? Thousands of these samples are taken throughout the country every year. The official samplers give the preference to those seeds which they think will on examination prove unsatisfactory, and, as it is possible to test only a proportion of these samples, the testing staff naturally select such of them as are more or less palpably bad. The system of sampling advisedly adopted involves, therefore, a double process of selection which leads to the testing of most, if not all, the inferior agricultural seeds sold in the country. It is not surprising in the circumstances that the percentage of samples that prove unsatisfactory is very large. These facts have been publicly stated more than once, and they are to be found in the

Annual Reports dealing with the administration of the Weeds and Seeds Act. But I think it only right to repeat this explanation for the benefit of those members of the general public who are liable to be misled by these and other misrepresentations of the kind.

"Black-Listing" in Operation.

It is to be regretted that any influential public journal should lend itself to ill-considered and unfounded charges, such as those to which I now refer. It is regrettable, for instance, that a leading Irish newspaper should assert that the Department have cast aside the exceptional powers conferred upon them by Parliament, when these powers have, wherever necessary, been used—and used with great effect—in a minatory way, and when at the time the assertion was made a large number of seed merchants who had not proved amenable to other influences were actually placarded all over their respective districts as vendors of inferior seeds. Bitter complaints have reached the Department as a result of this procedure. Solicitors have intervened, and traders have directly protested against what they call an attempt to ruin their businesses. One trader has, as a result, given up the seed business. The Department are, however, fortified by the knowledge that every possible expedient had been used with these recalcitrants before this extreme step was resorted to, and my answer here to-day to the critics of the Department in this matter is that the procedure which is being followed is a considered procedure, that it is one that has been instrumental in bringing about a steady and marked improvement year by year since it was adopted, and that no false charges based on an intentional or unintentional misrepresentation of the facts will lead to its reversal.

Compensation for Loss of Crop.

Before passing from the subject of seeds, I may mention that on certain facts coming to the knowledge of the Department some months ago a farmer in the South of Ireland was advised to take proceedings under the Sale of Goods Act against a retailer who had supplied him with inferior seed. The Department stood behind this farmer, giving him every possible assistance, and he recovered substantial damages for the loss of his crop. I am glad that the result of this prosecution was so satisfactory, particularly in view of the fact that it is extremely difficult to get farmers who suffer loss in this way to seek legal redress even in the most flagrant cases. Indeed many of them are strangely blind to their own true interests in the matter of securing sound and reliable seed. It is, for instance, impossible to prevent farmers, if they so desire, from purchasing the sweepings of hay lofts for sowing their land. Only the spread of education will bring home

the fact that this class of rubbish is not only dear at any price, but that it is absolutely harmful when used as seed.

Fertilisers and Feeding Stuffs.

The Department have further been arraigned in regard to manures and feeding stuffs. Instead of having done nothing for five years, as one responsible organ alleges, they have been constantly at work striving to bring about an improvement in the quality of these commodities. They have succeeded in driving out of Monaghan, Armagh, Mayo, in fact out of Ireland, a number of English firms which imposed the most worthless compounds as manures upon Irish farmers. They have stood behind a number of the victims and advised them to go into court rather than pay for these so-called manures, and they have, when necessary, furnished expert evidence in these cases. This class of " merchant " has all but disappeared from the country. Journals further afield than our own show a fairer appreciation of the actual situation. Dealing with this very subject quite recently, an English paper, *The Farm, Field and Fireside*, stated :—

> " We take off our hat—metaphorically—to the good work of the Department of Agriculture for Ireland. To its credit, it is said that Ireland is now the most difficult country in which to dispose of inferior manure. As a result, the output of genuine manures has been trebled, and manufacturers attribute this great increase to the action of the Department in suppressing fraudulent manures."

Whether the facts are as thus stated, or whether they are less favourable, the Department are aware that in the matter of seeds, manures and feeding stuffs the movement is distinctly and appreciably towards greater purity, to the immense advantage of the consumers of these particular farm requisites throughout the length and breadth of the country.

CHEESE-MAKING IN IRELAND.

By A. Poole Wilson, *Department of Agriculture and Technical Instruction for Ireland.*

Cheese-making consists of bringing milk to a suitable condition and temperature and then adding rennet. This coagulates the milk.

How Cheese is made.

The coagulum is then cut into pieces with knives in order to facilitate the separation of the whey, the contents of the vat being sometimes heated. The whey is then drawn off, and the curd is manipulated so as to express further moisture and develop acidity. Subsequently the curd is ground, salted, placed in moulds and submitted to pressure; and finally, after a period of one or two days, the cheese is placed in the curing or ripening room to develop the flavour peculiar to the type of cheese made. Each of these operations varies according to the type of cheese and to the quality of the milk received. There are about 240 named varieties of cheese. Many of these, however, are of the same type and differ very little from each other. The principal varieties made in Great Britain are:—Cheddar, Cheshire, Lancashire, Stilton, Derby, Leicester, Gloster, and Caerphilly.

It will be noted that in cheese-making two constituents of the milk are removed, viz., the fat and the curd, while in butter-making only one constituent is removed, viz., the fat.

The principles of cheese-making can be studied in books, but without a practical training to obtain the manipulative skill and the judgment necessary to control the various operations, failure is likely to be the result. It is necessary to spend at least one season in a cheese factory under a skilled maker who keeps records of the various operations, yields, and commercial results before one should undertake the management of a cheese factory. Once a maker has mastered the technique of making one variety, a much shorter training will enable him to manufacture other varieties with equal success.

Far more skill is required to make cheese than to make butter, and carelessness or want of cleanliness might result in the complete loss of the produce.

An Important Trade.

The magnitude of the cheese trade of the United Kingdom may be gauged from the following table of imports of foreign and colonial cheese:—

[Table.

TABLE I.—IMPORTS OF CHEESE INTO THE UNITED KINGDOM.

Country of Origin	YEAR									
	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
Netherlands	Cwt. 213,518	Cwt. 229,072	Cwt. 241,060	Cwt. 279,013	Cwt. 285,329	Cwt. 231,832	Cwt. 207,917	Cwt. 268,286	Cwt. 291,895	Cwt. 339,124
Belgium	925	778	1,674	401	325	854	618	442	1,804	—
France	19,816	18,977	19,317	22,522	23,404	20,911	17,977	16,030	15,218	—
Switzerland	8,801	8,792	9,977	9,517	10,793	11,454	11,064	12,266	12,580	—
Italy	84,020	89,880	88,691	80,372	77,228	85,267	75,157	91,060	101,794	97,932
United States of America ..	131,948	251,705	125,358	138,492	54,617	38,247	150,321	21,227	22,449	31,390
Other Foreign Countries ..	2,953	4,817	2,544	1,452	2,669	3,188	1,509	1,579	2,717	27,072
Total from Foreign Countries	461,981	604,021	488,621	531,769	454,365	391,753	464,563	410,890	448,457	—
Australia	—	—	3,515	757	599	3,710	12,602	1,408	7,933	18,157
New Zealand	78,626	126,216	192,304	264,995	368,531	453,785	397,845	543,917	547,182	742,419
Canada	1,902,075	1,908,555	1,687,789	1,508,565	1,566,546	1,607,064	1,473,275	1,352,570	1,293,768	1,167,778
Other British Possessions ..	—	2	4	—	49	28	41	2	—	—
Total from British Possessions	1,980,701	2,034,773	1,883,612	1,774,317	1,935,725	2,064,587	1,883,763	1,897,897	1,848,883	—
TOTAL ..	2,442,682	2,638,794	2,372,233	2,306,086	2,390,090	2,456,340	2,348,326	2,308,787	2,297,340	2,423,872
VALUE ..	£ 6,339,811	£ 7,607,641	£ 6,905,509	£ 6,684,203	£ 6,829,863	£ 6,809,876	£ 7,140,042	£ 7,414,091	£ 7,035,039	£ 7,966,194

Production in United Kingdom.

In addition to these imports there is the quantity of cheese manufactured in the United Kingdom. In 1891 Mr. James Long estimated the home production at 2,705,000 cwt. Mr. R. E. Turnbull estimated the average annual home make for the years 1895-99 as 2,187,000 cwt. A committee of the Royal Statistical Society calculated the annual supply of home-made cheese, based on a five years average ending June, 1908, at 1,866,000 cwt. In 1908 the English Board of Agriculture, as a result of inquiries, estimated the home production at 500,000 cwt., valued at £1,400,000, exclusive of that consumed on the farms.

Some Aspects of the Trade.

A striking feature of both the imports and home make is that they are shrinking. The imports reached their maximum in 1900, with 2,705,878 cwt. The reasons given for the shrinkage in imports are:—

(1) The increasing demand from the industrial centres of the exporting countries or other countries in proximity to them, e.g., Canada and the United States.

(2) Decrease in the Canadian production, owing to milk being diverted to milk condensing, milk powder factories, and to the increased demand for milk and cream in the growing towns and cities.

The reduction in the home production is attributed to the increased demand for milk on the part of the growing industrial centres, leaving less for cheese-making.

In view of the decrease in imports and home production it might be thought that, owing to the demand for cheese, its price must rise; this rise has been checked to some extent by the cheapness of imported meat and the greater consumption of butter, margarine, etc., or it may be that, in the absence of cheese, some of the industrial classes have been forced to take to the cheap meats.

Up to the year 1892 the imports of cheese exceeded the imports of butter, but since then the imports of butter have exceeded those of cheese.

Types of Cheese.

The cheese imported from North America and Australasia is nearly all of the Cheddar type. Soft and fancy cheese come from France. The Netherlands, besides sending its own types, such as Gouda and Edam, also sends cheese of the Cheddar, Cheshire, Lancashire, and Caerphilly varieties. Switzerland sends "Gruyère" cheese, Italy "Gorgonzola," "Parmesan," and some of the British type. The greater part of the home make is manufactured on farms, the Census of Production for 1907 showing only 75,000 cwt. as being made in cheese factories, of which 2,000 cwt. was produced in Ireland.

The production of cheese in Ireland and the Exports and Imports are as follows:—

Year	Exports		Imports		Home Make
	Quantity Cwt.	Value £	Quantity Cwt.	Value £	Quantity Cwt.
1904 .	1,142	2,855	42,707	119,580	—
1905 .	921	2,395	41,422	107,697	—
1906 .	1,222	3,513	40,906	117,605	—
1907 .	2,460	7,134	44,445	128,890	2,000
1908 .	3,231	9,208	36,159	103,053	—
1909 .	4,015	11,443	42,611	121,441	—
1910 .	2,798	7,764	43,560	120,897	—
1911 .	4,364	13,310	46,573	142,048	—
1912 .	5,450	17,440	42,986	137,555	4,801
1913 .	6,102	18,611	45,157	137,729	8,995
1914 .	—	—	—	—	11,084

It is evident that there is plenty of room for expansion before Ireland can supply itself with cheese, much less have a balance for export.

In Ireland cheese-making has not received the attention that it deserves as a remunerative method of disposing of whole milk. The principal reasons for this are as follows:—

Why Cheese is not extensively made in Ireland.

(1) Cheese as a food is not valued as highly as it should be, and methods of utilising it in cooked dishes are not generally known.

(2) Very few are skilled in cheese-making, and as it was not generally made in the past there is a total absence of tradition in the matter. Cheese-making may be said to be the traditional method of dealing with milk in Great Britain, while butter-making is the traditional way of dealing with milk in Ireland.

(3) The manufacture of a cheese of the old Cheddar type, requiring a curing or ripening period of at least three months, involved the locking-up of so much capital that farmers and owners of creameries, etc., have been slow to embark in the industry.

(4) That the milk could not be obtained in a sufficiently sweet and clean condition for cheese-making.

(5) The bye-product—whey—is not suitable for the rearing of calves, which is one of the most important branches of Irish farming.

(6) The value of the whey as a food for pigs is not realised.

These reasons explain but they do not justify the small size of the industry. With regard to the first it has been found that when a cheese factory is started the local consumption of cheese immediately increases. The Department have dealt with the second reason by

training cheese-makers. The third objection can be met by first manufacturing quick-selling varieties of cheese, and as the industry becomes established gradually taking up other varieties. The fourth objection can be overcome with proper care as is shewn by the fact that cheese of satisfactory quality has been made for some years from not only mixed milk delivered at the factories but also from milk collected at farms and carted to the factory. In case of (5), separated milk is deficient only in fat, and with the addition of some material in the form of meal or oil to replace the fat is eminently suited for the rearing of calves. On the other hand, whey is deficient not only in fat, but in the equally valuable proteid constituents of milk. The difference in character and composition between whey and milk is so marked that the addition of other foods fails to render the whey suitable for calf rearing. With regard to (6) it has been extremely difficult to convince farmers of the value of the whey for pig feeding. In the past in many cases the whey has either been left on the hands of the owners of the cheese factory or been run down the drains. Some proprietors of cheese factories have taken up the fattening of pigs, to utilise the bye-product, with very satisfactory results. The same difficulty arose in connection with the use of separated milk in the early days of the creamery industry, and even to the present day there are districts where separated milk is occasionally run into the drains.

In Great Britain the tendency is for groups of farmers to form associations, either co-operative or joint stock, in order to deal with the milk. A depot is erected near a station, for the collection and shipment of milk to towns, and any excess over the demand on any particular day is converted into cheese. This practice not only assists in steadying the milk market, but also ensures that the surplus milk is manufactured into cheese of uniform quality by a skilled maker. This tendency may be compared to the change which has taken place in our own butter industry. At farms which are not conveniently situated for sending milk to such collecting stations, one energetic farmer frequently deals with the milk from his own herd and purchases the milk of neighbours.

Butter or Cheese.

There is an aspect of the question which is worth considering. The greater part of the output of Irish butter is concentrated in the summer months. The result being that prices for butter invariably drop during th se months. It should be possible in the future to relieve this congestion by converting a portion of the milk into cheese, partly of a quick-selling type and partly into the longer-keeping varieties which could be sold later in the year. Many of the creameries in other countries are completely

equipped for butter-making and for cheese-making, so that the manager can readily turn from butter to cheese, or *vice versa*, as is considered best from the state of the markets. Furthermore, a cheese factory can be erected and equipped for considerably less than a creamery or separating station and can be operated profitably on much smaller supplies of milk. A cheese factory will thus serve those districts where there is insufficient milk to run a separating station at a profit.

In 1901 Cheddar cheese-making was commenced by the Department at a farm at Liscarroll, Co. Limerick. In 1907 the work was transferred to the Agricultural Station at Ballyhaise.

The results are shown in Table II. These returns compare very well with the returns from butter-making for the same years and indicate that the industry can be taken up with success at farms where a creamery or cheese factory is not within reach and a more profitable outlet than home butter-making is required. It is assumed that some member of the farmer's family acts as cheese-maker, and the value of the whey for pig feeding is considered sufficient to cover the whole of the cost of manufacture.

What type of Cheese should be made?

In advocating cheese-making the question naturally arises as to the type of cheese to be made. Which variety will yield most profit? We are close to the markets. New Zealand, Australia, and Canada can supply good Cheddar of heavy weights, and can utilise the time taken in reaching the market as part of the ripening or curing period. Again, there has been a change in the demand, and the producer has been compelled to adapt his methods to suit the popular taste and disregard his own ideas as to what constitutes quality and nutritive value. This change in the demand has been more pronounced in the hard cheeses than in other varieties. In Cheddar and Cheshire a pronounced preference is now shown for a softer cheese and one more mild in flavour. This means that more moisture is left in the cheese, and the ripening period is shortened. Old cheese-makers may not consider the modern cheese equal in quality to the old type, but it is the policy of a maker to turn out the article that will sell and not quarrel with the taste of the consumer.

Caerphilly Cheese.

The Department, in view of the fact that large quantities of separated milk were being wasted or sold at very low prices, or manufactured into raw material yielding very low returns, induced, in 1910, a creamery proprietor to attempt the manufacture of Caerphilly cheese in Ireland. Caerphilly is a flat, circular cheese, about 10 inches in diameter and 2½ inches deep, weighing

TABLE II.—DETAILS OF CHEDDAR CHEESE-MAKING BY THE DEPARTMENT.

	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
Gallons of milk made into cheese	12,007	13,173	11,236	8,444	16,582	18,572	13,103	18,412	14,977	Complete figures are not available.	19,758	12,909	12,373
Lb. of green cheese	12,027	13,291	11,420	8,571	16,923	18,976	13,411	18,672	14,152		20,449	13,445	12,209
Lb. of cured cheese	10,565	11,800	10,037	7,761	15,248	16,884	11,704	16,670	13,194		18,543	11,653	10,431
Shrinkage in ripening, per cent.	12·16	11·22	12·00	9·50	9·90	12·00	12·80	11·80	13·00		9·40	13·40	14·50
Nett value of cheese, pence per lb.	6·86	5·92	5·89	6·56	6·71	6·66	6.68	6·34	6·11		6·59	6·71	7·39
Nett value of cheese, per cwt. ..	s. d. 64 0	s. d. 55 3	s. d. 54 11	s. d. 61 2	s. d. 62 7	s. d. 62 1	s. d. 62 5	s. d. 59 2	s. d. 57 0		s. d. 61 6	s. d. 62 7	s. d. 68 11
Value of milk, pence per gallon exclusive of value of whey	6·04	5·30	5·26	6·03	6·17	6·05	5·97	5·74	5·38		6·19	6·05	6·25
Yield of cured cheese per gallon lb.	·88	·895	·893	·919	·919	·909	·893	·905	·881		·938	·903	·843
Gallons of milk, per lb. of cheese	1·136	1·116	1·119	1·088	1·087	1·099	1·118	1·104	1·131		1·065	1·107	1·186

Some of the cheese was held 5 to 6 months before being marketed.

Cost of manufacture and value of whey are not taken into consideration. It may be generally stated that the value of the whey as a food for pigs is half that of the value of separated milk, and covers the cost of the manufacture of cheese on the farm.

about 8 lbs. It can be made from summer or winter milk and sold in 10 to 14 days after manufacture, so that a factory owner has not to wait long for his money. The yield is good, as it contains a higher percentage of water than any of the hard cheese and most of the semi-hard cheese. There is a good demand for such cheese in the industrial districts of South Wales, and it has been successfully introduced into other industrial districts. The results of this experiment were described in an article in the Department's JOURNAL, Vol. XI., No. 4, p. 669. The experiment was so successful that the proprietor has continued cheese-making. Since then a number of other factories have commenced, and notwithstanding all the difficulties due to the establishment of a new industry the results have been exceedingly satisfactory. On examining the prices for Caerphilly cheese in Table VI. it will be noted that prices are generally at their lowest in the months of May, June and July. The Department suggested to the cheese factory owners that during this period they should turn their attention to Derby cheese or Cheddar truckles. The Derby is a flat cheese, 14 inches to 16 inches diameter and about 4 to 5 inches thick, weighing about 30 lbs. It can be sold a month to six weeks after making and can also be made from winter milk. It contains less moisture than Caerphilly but more than Cheddar cheese. The Cheddar truckles are about 10 inches high and 7 inches in diameter and weigh about 12 lbs. They are similar to the larger Cheddars in every other way, but can be sold when six weeks old. Both these types have been made successfully in Ireland, and have yielded profitable returns, and the quality has been highly praised. For the three types there is practically an unlimited demand amongst the large industrial population of the United Kingdom.

[TABLES.

TABLE III.—MONTHLY AVERAGE PRICES OF FIRST AND SECOND

(Compiled from weekly reports

Year	January	February	March	April	May	June
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
1904 ..	67 6—72 6	68 0—72 6	65 6—71 0	62 6—69 0	63 0—68 6	64 0—70 0
1905 ..	59 0—67 0	59 0—67 0	58 6—67 0	60 6—69 6	60 6—70 0	59 0—67 6
1906 ..	66 0—73 0	67 6—73 6	68 6—74 6	69 0—75 6	69 0—74 0	64 6—68 6
1907 ..	73 0—79 0	74 0—80 0	74 6—81 0	74 6—81 0	71 6—77 6	72 0—77 6
1908 ..	67 0—72 6	67 6—73 0	67 0—73 6	66 6—71 0	66 0—70 6	65 0—70 6
1909 ..	66 6—74 6	65 6—74 0	67 0—75 0	66 6—73 0	68 0—74 0	67 0—74 6
1910 ..	65 0—74 6	65 6—73 6	65 6—74 6	66 6—73 0	64 0—70 6	62 6—68 0
1911 ..	64 0—72 0	68 0—77 0	69 6 76 6	71 6—76 6	73 0—77 0	69 0—73 0
1912 ..	83 6—89 0	84 0—90 0	84 6—90 6	83 0—89 0	75 6—80 0	72 6—76 0
*1913 ..	72 0—75 6	71 0—76 0	70 6—76 0	70 0—70 6	69 6—76 0	66 6—72 0

* This year the prices are for England only.

TABLE IV.—MONTHLY AVERAGE PRICES OF FIRST AND SECOND QUALITY

(Compiled from weekly reports

Year	January	February	March	April	May	June
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
1904 ..	51 0—54 6	50 0—53 0	50 0—52 6	47 6—50 0	41 0—44 0	41 0—44 0
1905 ..	52 6—54 0	51 6—53 6	54 0—55 6	56 6—58 6	54 0—56 6	49 6—51 6
1906 ..	63 0—65 0	62 0—64 0	63 6—65 6	64 0—68 0	62 0—64 6	56 6—58 0
1907 ..	63 0—64 6	65 0—67 0	66 0—67 6	64 0—66 0	65 0—67 0	64 0—64 6
1908 ..	62 0—64 6	62 6—64 6	63 0—65 0	63 0—64 6	61 6—63 6	55 6—56 6
1909 ..	60 6—62 6	61 6—63 6	62 6—65 6	62 6—66 0	64 0—65 6	60 0—61 6
1910 ..	57 0—59 0	59 0—61 6	60 6—63 0	61 6—64 0	59 0—61 6	56 6—60 0
1911 ..	58 0—60 0	59 0—61 6	60 6—62 6	62 6—64 0	62 0—63 6	— —59 0
1912 ..	73 0—74 6	74 0—75 6	75 0—76 6	75 6—76 6	73 0—74 6	67 6—68 6
*1913 ..	62 0—64 6	62 0—64 6	63 0—65 0	62 6—64 6	60 0—62 6	60 0—62 0

* The prices this year refer to England only.

QUALITY OF CHEDDAR CHEESE IN GREAT BRITAIN PER CWT.

of Board of Agriculture.)

July	August	September	October	November	December	Average for year
s. d. s. d. 58 6—65 0	s. d. s. d. 55 0—60 6	s. d. s. d. 55 6—61 6	s. d. s. d. 55 6—63 0	s. d. s. d. 57 0—64 0	s. d. s. d. 59 0—66 6	s. d. s. d. 61 0—67 0
59 0—66 0	60 6—66 6	63 0—69 0	62 0—69 0	62 6—70 6	65 0—72 0	60 6—68 6
61 6—66 0	63 0—68 6	68 0—73 0	70 0—76 0	72 0—78 0	72 0—78 6	67 6—73 0
70 0—73 0	68 0—73 0	63 6—71 0	65 0—71 0	66 6—74 0	65 6—72 0	65 6—72 0
65 0—70 6	66 0—71 6	63 0—69 6	64 6—72 0	65 6—73 6	64 6—73 6	70 0—76 0
64 6—70 0	63 6—69 6	64 0—72 0	62 0—72 0	65 6—74 0	65 6—74 0	65 6—73 0
60 6—67 0	63 0—69 0	62 0 68 0	63 0—70 0	63 6—70 6	62 6—71 0	63 6—71 0
66 0—68 6	67 0—70 6	73 0—77 0	78 6—83 0	81 0—86 0	82 0—87 0	72 0—77 0
68 6—72 6	68 6 72 6	70 6—74 0	71 6—74 0	71 0—74 0	70 6—74 0	75 6—79 6
66 6—72 6	69 6—75 0	73 0—77 0	74 0—79 0	74 6—80 0	75 6—82 0	71 0—76 6

OF CANADIAN CHEDDAR CHEESE IN GREAT BRITAIN PER CWT.

of Board of Agriculture.)

July	August	September	October	November	December	Average for year
s. d. s. d. 38 6—41 6	s. d. s. d. 39 6—42 0	s. d. s. d. 41 6—44 0	s. d. s. d. 42 6—45 0	s. d. s. d. 46 0—49 0	s. d. s. d. 49 0—51 6	s. d. s. d. 45 0—47 6
48 0—49 0	52 6—54 0	54 0—56 0	55 6—57 6	58 0—59 6	61 6—63 0	54 0—55 6
57 0—58 0	58 6—60 0	60 6—62 6	62 0—63 6	61 0—63 6	61 0—63 0	61 0—63 0
55 6—57 0	54 6—57 0	57 0—59 0	61 0—62 6	60 6—63 0	60 6—63 6	61 6—63 0
57 0—58 6	58 6—60 0	59 6—61 0	60 0—61 6	59 6—61 6	59 0—61 0	60 0—62 0
57 0—58 6	56 0—58 0	56 0—58 0	55 0—57 6	55 6—58 0	56 0—58 0	59 0—61 0
53 0—54 6	53 0—54 6	53 6—55 0	54 0—56 0	54 6—56 6	56 6—58 6	56 6—58 6
57 0—58 6	61 6—63 0	68 0—69 6	68 6—70 0	68 6—70 0	69 6—71 0	63 0—64 6
63 6—65 6	63 6—66 0	65 0—67 0	64 6—66 0	63 0—65 0	62 0—64 6	68 6—70 0
63 0—64 6	63 6—65 6	65 0—67 0	64 0—66 0	64 0—66 0	65 6—68 0	63 0—65 0

TABLE V.—AVERAGE WHOLESALE LONDON PRICES
(Compiled by W. Weddel

For year ending 30th June	1905	1906	1907	1908
	s. d.	s. d.	s. d.	s. d.
Canadian	50 6	60 10	64 1	62 10
New Zealand	50 6	63 2	64 1	62 1

TABLE VI.—WHOLESALE PRICES FOR
(Monthly average of the highest and lowest

	PER		
	1908	1909	1910
	s. d. s. d.	s. d. s. d.	s. d. s. d.
January	50 10—58 3	47 2—56 2	60 0—70 0
February ..	56 0—65 0	50 9—65 0	64 0—75 0
March	59 0—66 0	52 6—67 3	62 0—72 0
April	50 9—57 6	48 3—57 6	52 0—59 0
May	46 0—53 0	43 8—53 0	43 0—52 0
June	50 6—57 0	50 6—57 0	40 0—52 0
July	45 6—54 6	45 6—54 0	48 0—56 0
August	49 8—56 10	48 0—55 0	46 0—54 0
September ..	59 4—65 4	57 0—64 0	48 0—57 0
October	53 6—59 6	52 9—59 0	56 0—63 0
November ..	57 8—65 10	55 8—66 0	57 0—63 0
December ..	58 8—64 8	58 8—64 8	63 0—72 0

PER CWT. OF CHOICEST IMPORTED CHEDDAR CHEESE.

& Co., Limited.)

1909	1910	1911	1912	1913	1914	Ten years average
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
63 0	60 6	59 8	71 5	64 3	68 3	62 6
62 10	58 9	59 1	69 10	62 6	66 0	61 11

CAERPHILLY CHEESE PER CWT.

weekly prices. Taken from trade papers.)

Cwt.			
1911	1912	1913	1914
s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
71 6—78 3	67 11—76 2	68 0—74 5	65 4—70 0
73 4—79 8	71 10—77 8	71 3–78 4	68 5—75 0
67 6—72 0	56 2—62 6	67 8—73 7	69 1–74 4
58 6—64 6	54 10—61 0	54 2—60 7	56 6—64 11
49 6—55 0	48 0—54 2	39 6—48 2	50 2—57 2
46 1—53 8	54 9—59 5	47 0—53 0	43 7—51 9
58 3—61 10	45 1—53 5	49 3—57 2	45 9—53 7
54 6—65 8	55 1—62 0	52 5—59 10	53 6—62 1
66 9—76 6	50 6—59 2	62 6—68 3	52 6–60 4
72 1—78 3	56 2—63 0	58 9—68 5	63 9—70 5
70 4—76 4	56 7—63 0	54 4—60 6	60 3—68 0
74 4—80 6	60 11—66 10	56 2—61 8	68 11—75 10

TABLE VII.—MONTHLY AVERAGE PRICES OF FIRST AND

(Compiled from weekly reports of Board of Agriculture and based on the

Year	January	February	March	April	May	June
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
1904 ..	75 0—78 0	75 0—78 0	65 6—71 0	57 6—63 0	49 0—55 0	43 6—51 0
1905 ..	63 6—72 0	63 6—73 0	63 0—71 6	58 6—66 0	52 0—59 0	47 0—54 0
1906 ..	67 6—75 0	68 6—76 6	69 6—77 6	66 6—73 0	61 6—66 0	53 6—58 6
1907 ..	75 0—80 6	77 6—83 0	76 0—81 0	65 6—70 6	61 6—67 0	56 6—61 6
1908 ..	69 0—73 6	68 0—74 0	67 0—73 0	61 6—67 0	56 0—61 0	49 0—54 6
1909 ..	73 6—78 0	75 0—79 6	73 0—78 0	63 6—69 0	59 0—63 6	56 0—61 0
1910 ..	71 6—77 0	72 0—77 6	68 6—75 0	61 0—66 6	53 0—59 0	51 0—56 6
1911 ..	64 6—71 6	66 6—72 6	65 0—71 6	62 0—67 6	53 0—59 0	52 6—58 0
1912 ..	81 6—87 6	81 0—87 0	67 0—73 0	61 0—66 6	52 6—59 0	53 6—59 0
1913 ..	70 0—75 6	74 6—80 6	67 0—73 0	64 6—70 0	55 6—61 6	51 6—57 6

TABLE VIII.—RANGE OF PRICES FOR MEDIUM TO

(Taken from the trade papers. Most of this cheese

Year	January	February	March	April	May	June
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
1908 ..	—	—	—	—	55 0—64 0	50 0—60 0
1909 ..	70 0—85 0	72 6—86 6	60 0—84 0	63 0—74 0	60 0—70 0	55 0—69 0
1910 ..	70 0—78 0	60 0—75 0	55 0—75 0	58 0—66 0	55 0—67 0	49 0—62 6
1911 ..	60 0—68 0	56 0—70 0	55 0—70 0	60 0—70 0	55 0—69 0	52 6—62 6
1912 ..	77 6—87 0	70 0—90 0	60 0—86 0	63 0—70 0	62 0—68 0	52 6—63 0
1913 ..	70 0—78 0	70 0—78 0	65 0—78 0	70 0—79 0	55 0—72 6	52 6—63 0
1914 ..	70 0—84 0	65 0—85 0	62 6—82 6	60 0—73 0	52 6—68 0	52 6—60 0

SECOND QUALITY CHESHIRE CHEESE PER 120 LB.

prices paid at the cheese fairs held at Chester, Nantwich and Whitchurch.)

July	August	September	October	November	December	Average for year
s. d. s. d. 41 6—49 0	s. d. s. d. 42 6—50 6	s. d. s. d. 57 0—59 6	s. d. s. d. 54 6—63 0	s. d. s. d. 59 0—67 6	s. d. s. d. 62 0—70 0	s. d. s. d. 56 6—63 0
47 0—53 6	53 6—61 0	54 6—61 6	60 6—66 6	66 0—74 0	67 0—75 0	56 6—64 6
57 0 62 0	61 6—66 0	62 0—67 6	69 0—75 0	74 0—79 6	73 6—80 0	65 6—71 6
55 6—61 0	57 0—62 0	59 0—65 0	64 0—69 6	67 6—73 0	67 6—72 6	63 6—69 0
58 0—63 0	57 6—63 0	57 0—63 6	56 6—62 0	62 6—68 6	65 6—72 0	60 6—66 0
55 0—61 0	52 6—58 0	59 0—65 0	62 0—68 0	67 6—73 0	68 6—75 0	63 6—69 0
52 0—57 6	53 0—59 0	56 6—62 0	62 6—68 0	66 0—72 0	64 0—70 0	61 0—66 6
55 6—61 6	58 0—64 0	71 0—77 0	77 0—84 0	75 6—82 6	77 6—84 0	65 0—71 0
52 6—58 0	56 0—61 6	64 0—69 6	64 6—70 0	65 0—71 0	64 6—70 6	63 6—69 6
54 0—59 6	57 0—63 0	59 6—65 6	62 0—67 6	67 6—73 0	72 6—78 6	63 0—68 6
				10 Years	average ..	61 10—67 10

BEST LANCASHIRE CHEESE PER 120 LB.

is sold at Preston and Lancaster cheese fairs.)

July	August	September	October	November	December	—
s. d. s. d. 53 0—63 0	s. d. s. d. 57 6—66 6	s. d. s. d. 60 0—67 6	s. d. s. d. 58 0—65 6	s. d. s. d. 66 0—75 0	s. d. s. d. 68 0—76 0	s. d. s. d. —
57 6—66 0	56 0—63 0	58 0—70 0	66 0—73 0	70 0—78 0	—	—
47 6—62 6	57 6—66 0	60 0—70 0	62 6 73 0	65 0—72 0	63 0—70 0	—
56 0—63 0	50 0—65 0	63 0—80 6	72 6—83 6	70 0—82 6	75 0—80 0	—
50 0—63 0	55 0—68 6	66 0—78 0	70 0—76 6	66 0—77 6	68 0—76 0	—
60 0—69 0	62 6—70 0	63 0—72 0	62 6—70 0	62 6—71 0	67 0—72 0	—
52 6—63 0	—	—	—	—	—	—

Tables III. to VIII. give the average prices for various types of cheese for a number of years. The general tendency of the prices is upwards, and with the increase in the industrial population and a better realisation of the value of cheese as a food there is no reason to think that there will be any great fall in prices in the future.

Prices of Cheese.

The prices for Lancashire and Cheshire cheese are per 120 lb. The prices for the other cheese are per cwt. Information as to prices of cheese, besides appearing in the daily press and weekly trade papers, is collected by the English Board of Agriculture and published in their weekly market reports and summarised in their Annual Report of Agricultural Statistics, Part III.—Prices and Supplies. The prices given for Cheshire and Lancashire cheese are those paid at the cheese fairs, and from this price must be deducted the cost of carriage and the local tolls. The prices for the other types of cheese represent the wholesale prices from which freight or carriage, commission and discounts must be deducted, in order to determine the net price to the manufacturers.

The chief factors influencing the yield of cheese from milk are the percentage of fat in the milk, and the percentage of water in the cheese.

Yield of Cheese per Gallon.

The average percentages of moisture in the three types of cured cheese mentioned are :—

	Water per cent.
Cheddar	37
Derby	42
Caerphilly	47

So that, with the same percentage of fat in the milk the yields follow the percentage of water, but bearing in mind that cheese with the higher percentage of moisture shrinks more in weight. With milk containing 3·6 per cent. of fat the yields per gallon expected are :—

	lb. per gal. Milk.
Cheddar	1·0
Derby	1·086
Caerphilly	1·19

The actual average yields, at a number of cheese factories, were slightly in excess of the above figures and may be put at :—

	lb. per gal. Milk
Cheddar	1·0
Derby	1·1
Caerphilly	1·2

The increased yield was due to the fact that the shrinkage was less than was anticipated and that a slightly softer curd containing more moisture had been made.

As the percentage of fat in the milk is generally low in the spring and high in the autumn so did the yield vary.

Tables IX. and X. show the calculated yields of cheese containing definite percentages of moisture from milk containing definite percentages of fat. This will enable the minimum yield of cheese made under normal conditions to be determined.

TABLE IX.—YIELD OF CHEESE.

Per cent. of fat in the milk.	Per cent. of water in the cheese.											
				Average Cheddar Ripe			Average Derby Ripe		Average Caerphilly Ripe			
	30%	32%	34%	36%	38%	40%	42%	44%	46%	48%	50%	52%
	lb. of cheese from one gallon of milk.											
3·00	·774	·796	·819	·846	·872	·900	·932	·966	1·000	1·043	1·080	1·127
3·25	·828	·850	·875	·904	·932	·963	·997	1·033	1·070	1·115	1·154	1·200
3·50	·881	·905	·932	·962	·991	1·025	1·061	1·099	1·138	1·186	1·228	1·282
3·75	·934	·959	·988	1·020	1·051	1·086	1·125	1·165	1·207	1·258	1·302	1·360
4·00	·987	1·014	1·044	1·078	1·111	1·148	1·189	1·232	1·276	1·330	1·377	1·437
4·25	1·04	1·069	1·100	1·125	1·171	1·210	1·252	1·298	1·344	1·401	1·451	1·514
4·50	1·093	1·123	1·157	1·194	1·231	1·272	1·306	1·364	1·413	1·473	1·525	1·592

TABLE X.—YIELD OF CHEESE.

Per cent. of fat in the milk.	Per cent. of water in the cheese.											
				Average Cheddar Ripe			Average Derby Ripe		Average Caerphilly Ripe			
	30%	32%	34%	36%	38%	40%	42%	44%	46%	48%	50%	52%
	lb. of cheese from 100 lb. of milk.											
3·00	7·50	7·70	7·93	8·19	8·44	8·72	9·03	9·36	9·69	10·10	10·46	10·91
3·25	8·01	8·23	8·47	8·75	9·02	9·32	9·65	10·00	10·35	10·79	11·17	11·66
3·50	8·53	8·76	9·02	9·31	9·60	9·92	10·27	10·64	11·01	11·48	11·89	12·41
3·75	9·04	9·29	9·56	9·87	10·18	10·52	10·89	11·28	11·68	12·18	12·61	13·16
4·00	9·56	9·82	10·11	10·43	10·76	11·12	11·51	11·92	12·35	12·87	13·33	13·91
4·25	10·07	10·34	10·65	10·99	11·34	11·71	12·12	12·56	13·02	13·56	14·04	14·66
4·50	10·58	10·87	11·20	11·56	11·92	12·31	12·64	13·20	13·68	14·26	14·76	15·41

The yield of cured cheese also depends on the curing room, the length of time held after ripening, a hot curing room or hot season causing greater shrinkage, and the longer the cheese is held the more it loses.

Buildings required.

On the farm any good stone or brick outhouse can be converted into a cheese-making room and curing room, as long as the rooms are cool in summer and can be well ventilated. The "making" room should have a good concrete floor and should be well drained. The space required is about 15 feet by 15 feet for each room. The "curing" or "ripening" room may be over the "making" room. A small boiler for 20 lb. pressure or a Scotch boiler will be sufficient for heating purposes. The cost of an outfit capable of converting 200 gallons of milk daily into Caerphilly cheese will be £50 to £60.

Cost of Buildings.

The buildings for factories dealing with 500 to 750 gallons of milk daily have cost £200 to £270, and to deal with 1,000 to 1,500 gallons daily the building will cost somewhere about £400 to £500. In several cases old mills have been readily transformed into cheese factories. A number of creameries have been also altered so as to act as separating stations and cheese factories at very little expense.

Curing Room.

The chief points about the building are that the curing room should be cool in summer so as to ripen or cure the cheese without undue loss of weight. It should be well lighted and arranged so that an ample inflow of cool and moist air can be induced and ventilation controlled.

Steam and Water supply.

Where the cheese factory is erected in connection with a creamery the question of the water and steam supply does not arise, as the creamery can supply the factory, and a suitable charge be made against the cheese factory for these services.

Machinery.

A cheese factory for 500 to 1,000 gallons of milk, working independently of a creamery, will require a small vertical boiler, 7 feet to 8 feet high, a small engine to develop about 4 to 6 B.H.P., to drive water pump, whey pump and curd mill, together with the necessary piping, shafting and water tanks.

Utensils.

The principal utensils required are :—a weighing machine and receiving tank, cheese vats, presses, moulds, loose wooden shelving for holding the cheese while curing, and a slow combustion stove. Cream vats are quite suitable for cheese-making, and as creameries are now putting in modern vats with brine coils for cream ripening, the old vats may be purchased at reasonable prices. Excepting the moulds, the utensils are nearly the same whatever variety of cheese is made. As each type of cheese is usually made a distinctive shape, different moulds are required for each variety.

Shelving for Curing Room.

For Caerphilly, Derby, or small Cheddar cheese, all shelving in the curing room should be loose, no nails to be used, each shelf being supported on the one below by timber blocks, cut to suit the cheese being made. These shelves can be taken down, cleaned and stacked when not required.

Where heavy cheese, 50 to 80 lb. weight, are made "turning shelves" may be put in, as the labour of turning and the risk of damage to the edges of the cheese is thereby reduced.

Cost of Plant, etc.

The cost of a plant to convert 500 gallons of milk daily into Caerphilly cheese has varied from £100 to £150. This sum included the local carpenter's and smith's work. A complete plant to convert 500 to 750 gallons of milk daily into Caerphilly, Derby or Cheddar cheese will cost £250 to £300, and the complete factory, including building, £550 to £600.

Staff of Workers.

It is essential that a good cheese-maker be employed, otherwise failure is likely to result. The wages of a good maker are 30*s.* to 40*s.* per week. In exceptional cases, where large quantities of milk are being received and the maker has to supervise a staff of unskilled assistants, the wages may amount to 60*s.* per week. A maker with an unskilled assistant will be able to deal with 500 to 750 gallons of milk daily.

Cost of Manufacture.

So far, in Ireland, cheese-making on the factory scale has not been carried on apart from a creamery, and hence absolute costs of manufacturing at a cheese factory only cannot be given. The cost of manufacture at several factories attached to creameries has been worked out and is as follows :—

Fixed Costs, including 5 per cent. interest on capital, full depreciation, an allowance of £20 to £30 to the creamery manager who acted as salesman and manager, rent, rates, taxes and insurance

of building, plant, and stocks, varied from 2*s*. 6*d*. to 4*s*. per cwt. The fixed costs naturally range more than the variable costs, owing to the differences in the output. The lower figure being for a supply of 150,000 gallons of milk and the higher for a supply of 40,000 gallons.

Variable Costs, including packages, paper, cloth, rennet, coal, salt, cartage, stationery, etc., ranged from 2*s*. 5*d*. to 3*s*. per cwt. The *fixed* and *variable* costs differed in the various factories, but the lowest total cost was 5*s*. 4*d*. and the highest 6*s*. 9*d*. This accords very closely with the estimate of 6*s*. per cwt. made in the earlier article on Caerphilly cheese-making in the Department's JOURNAL, Vol. XI., No. 4, p. 669.

The cost at a separate factory is not likely to exceed the above figures by more than 1*s*. per cwt. where the cheese-maker acts as manager and salesman. This would bring the cost of manufacture at independent factories to 7*s*. per cwt. or ¾*d*. per lb.

Marketing.

The chief market for cheese being in Great Britain, owing to the transhipment at the ports of departure and arrival, it is necessary to pack all cheese in strong crates. To this extent the Irish producer is handicapped. The British maker, in the majority of cases, places his cheese unpacked on clean straw in the bottom of a cart or railway truck.

In Great Britain cheese is sold as follows :—

1. By the makers at the various cheese fairs or markets which may be held weekly, as at Highbridge, in Somerset (Caerphilly and Cheddar); once or twice a month, as at Lancaster and Preston (Lancashire cheese); Nantwich, Whitchurch, and Chester (Cheshire cheese). These fairs are attended by brokers buying for themselves or by the buyers of wholesale houses. The brokers may sell again to wholesale merchants.

2. The wholesale merchants may send their buyers to the dairies or factories at certain periods to examine the cheese and make offers for the stock in hands.

3. The cheese may be consigned to wholesale houses who will sell it on commission.

4. The cheese may be sold at firm prices.

The only cheese market to which much Irish cheese has been forwarded is that at Highbridge, in Somerset. The charge for selling is 1*s*. per cwt., and cost of transit to the market has also to be deducted from price. This latter charge is about the same as for butter and may be put at an average of 1*s*. 6*d*. per cwt.

While a few representatives of wholesale houses call once or so during the year at Irish factories, owing to the distance from markets

the second method is not followed in this country. As cheese-making develops, it may become more common. The third method is that generally adopted by Irish factories. The costs of marketing by one firm are as follows :—

Average landed price for Caerphilly cheese, 1914, 63*s*. 3*d*. per cwt.

		s.	*d*.	*s*.	*d*.	
Less 2*d*. in the £ discount	..	0	6			
Five per cent. commission	..	3	0			
Carriage	..	1	6			
Total marketing charges	..			5	0	per cwt.
Leaving the F.O.R. price	..			58	3	per cwt.

Some buyers return a price without disclosing their charges for marketing.

The fourth method depends on the manager having a good knowledge of the special requirements of the customer and a good idea as to quality of cheese. This method is, however, slowly growing.

A number of buyers, such as grocers and wholesale merchants, prefer to contract for the delivery of definite quantities weekly at a fixed price for three, six, nine or twelve months. This is a method of selling which requires great judgment and consideration. The quality of the cheese must be good and uniform or it may happen that if prices drop the buyer becomes more critical of quality, while if prices rise the buyer is satisfied unless quality varies too much.

As an example of the manner in which cheese prices rise through handling, the following table, published in the Agricultural Statistics of the Board of Agriculture and Fisheries for the year 1913, is interesting. (See Cd. 7,487. 1914.)

[TABLE.

TABLE XI.—PRICES FOR

	1905	1906	1907
	s. d. s. d.	*s. d. s. d.*	*s. d. s. d.*
Average of prices at Chester, Nantwich and Whitchurch cheese fairs ..	56 6—64 6	65 6—71 6	63 6—69 0
Average of prices at Liverpool ..	60 0—66 6	67 0—72 6	67 0—72 6
Average of prices at London ..	—	—	—

The increase in cost of cheese at Liverpool over the cost at fairs has thus risen in recent years, and now averages 5*s.* 6*d.* per 120 lb. or between 8 and 9

It may be that a part of the increase in price shown in the above table in the difference between the price at fairs and at the towns mentioned is due to buying the cheese in a "green or half cured" condition compared with earlier years, and thus the shrinkage is greater. In holding up cheese it must be borne in mind that shrinkage in weight takes place owing to the drying out of moisture, and there is the interest on the money locked up in stocks.

Holding up Cheese.

The difference in shrinkage between selling a Cheddar cheese at three months and six months old may vary from 4 to 6 per cent., even when stored in a cool room (not above 60° F.), and, allowing for interest, the price obtained must be 3*s.* 6*d.* to 4*s.* per cwt. more to warrant holding for the extra three months, apart from the extra labour of handling the cheese and the extra room required.

The prices and yields of cheese, together with costs of production, having been determined, it only remains to use these figures in order to show the price which may be expected for milk by the farmer. This would be a comparatively easy matter if the same quantity of cheese were made each month and marketed at the prices shown for that month.

Returns to Farmers.

The large Cheshire, Cheddar, and Lancashire cheese are frequently held three months to ripen; Derby cheese a month to six weeks; Caerphilly may be held anything between ten days and three weeks.

If we assume that at an Irish factory the percentage output each month is the same as for butter, then the approximate average prices for the year may be calculated with some degree of accuracy. Assuming the middle price is obtained for Caerphilly cheese, that the cheese is sold at a fortnight old, and that the percentage output

CHESHIRE CHEESE PER 120 LB.

1908	1909	1910	1911	1912	1913
s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
60 6—66 0	63 6—69 0	61 0—66 6	65 0—71 0	63 6—69 6	63 0—68 6
64 0—70 0	65 6—72 6	64 6—71 0	68 0—74 0	69 0—74 6	68 6—74 0
—	68 6—78 6	66 6—76 6	75 0—83 0	74 6—81 0	73 0—78 0

per cent. of price paid at the fairs; while in London the increase in price is 15 to 16 per cent.

is the same as for butter, then the landed price for 1914 is 63*s*. 3*d*. per cwt., and for 1913 is 57*s*. 1*d*. per cwt.

The cost of marketing is 5*s*. per cwt. This reduces the landed price to a free-on-rail price of—

	1913	1914
F.O.R. price	52*s*. 1*d*.	58*s*. 3*d*. per cwt.

The cost of manufacture may be taken as 6*s*. per cwt., leaving—

46*s*. 1*d*.   52*s*. 3*d*.,

respectively, for the quantity of milk required to produce 1 cwt. of Caerphilly cheese. As 1·2 lb. of cheese was yielded per gallon the milk required is 93·3 gallons. The money obtained above would yield—

5·93*d*.   6·72*d*. per gallon.

The whey is worth at least ½*d*. per gallon, compared with separated milk at a 1*d*. for feeding pigs, so that as there is 80 per cent. of the milk as whey the total average return to the farmer is—

6·33*d*.   7·12*d*. per gallon

for his milk in the two years, respectively. This price would have been higher if Derby or Cheddar cheese were made during the months of May, June, July, as suggested, instead of making Caerphilly.

One naturally asks how does this compare with butter-making. The average price paid for milk in 1913 at 102 creameries was 4·48*d*. per gallon, with separated milk and buttermilk returned free. Adding 80 per cent. of separated milk at 1*d*. per gallon, we get a total return to the farmer of 5·28*d*. per gallon, compared with 6·33*d*. for cheese-making, a difference in favour of cheese-making of 1·05*d*. per gallon of milk. The returns of creamery prices for 1914 are not yet available, so that a strict comparison cannot be made for that year.

Another way of looking at the matter is, if a farmer receives 7·12*d.* per gallon for milk when making cheese, what price should be obtained for butter in order to ensure the same return? Deducting the value of the separated milk from 7·12*d.* gives 6·82*d.* per gallon. To realise this price for milk, 141*s.* 6*d.* per cwt. plus working expenses would have to be obtained for butter.

Cheese or Butter.

The average price received for butter F.O.R. in 1913 was 112*s.* 10*d.* per cwt. based on returns from 102 creameries, the highest price at any one creamery being 122*s.* 6*d.* These prices for butter would yield 5·30*d.* and 5·73*d.* per gallon, respectively, for the whole milk.

If we take the average F.O.R. price which should have been received for butter in 1914 as 119*s.* per cwt., working expenses 12*s.* per cwt., and 2·4 gallons of milk to the pound of butter, the return from butter-making should be 4·77*d.* per gallon, adding the value of separated milk we get 5·57*d.* per gallon for whole milk.

Comparing the two years:—

	1913.	1914.
	s. *d.*	*s.* *d.*
Average price for butter per cwt. F.O.R.	112 10	119 0
Average price for Caerphilly cheese per cwt. F.O.R.	52 1	58 3
Average working expenses per cwt.:		
Butter	12 0	12 4
Cheese	6 0	6 0
Price realised for milk per gallon by butter-making ..	4·5*d.*	4·77*d.*
Price realised for milk per gallon by Caerphilly cheese-making	5·93*d.*	6·72*d.*
Increase in price per gallon in favour of cheese-making, value of bye-products not taken into consideration ..	1·43*d.*	1·95*d.*
Price for milk per gallon from butter-making, including value of separated milk at 1*d.* per gallon and 80 per cent. returned	5·3*d.*	5·57*d.*
Price for milk per gallon from cheese-making, including value of whey at ½*d.* per gallon and 80 per cent. returned	6·33*d.*	7·12*d.*
Difference in favour of Caerphilly cheese-making per gallon ..	1·03*d.*	1·55*d.*

To obtain merely the same average price for the whole milk as was realised by butter-making the Caerphilly cheese should be sold at an average price of 49*s.* and 51*s.* 2*d.* per cwt. in the two years, respectively.

Comparisons between the value of cheese-making and butter-making to the farmer can be readily worked out from Tables XII. to XV. In general it may be said that, making allowances for difference in costs of production and in value of separated milk and whey, cheese-making will pay best unless the price of butter at the creamery exceeds $2\frac{1}{3}$ to $2\frac{1}{2}$ times the price of cheese.

Whey.

The amount of whey which can be returned to the farmer may be put at 80 to 85 per cent. of the volume of milk delivered. Its chief value is as material for feeding pigs in connection with other foods. It contains about 93 per cent. water, ·3 per cent. fat, ·8 per cent. of proteids, and 5 to 6 per cent. of milk sugar. Its feeding value for pigs may be put as half that of separated milk. The whey pump, piping, and tank, the latter being of oak, should be kept perfectly clean, and the whey should be fed as sweet as possible.

Standards for Cheese.

There are no official standards for cheese, but in an article published in the Department's JOURNAL, Vol. XIV., No. 3, p. 499, it is shown that a standard of 45 per cent. of fat in the dry matter of cheese is a suitable one for a whole-milk cheese.

As a food, cheese is neglected in Ireland. It is one of the most concentrated foods and 1 lb. of it may be said to be equal to 2 lb. of fresh meat. It is as digestible as milk or meat. It may not suit all persons, but the same may be said of almost any food.

In conclusion it may be pointed out that cheese-making offers a remunerative outlet for those creameries which have to purchase whole milk, and that on account of low cost for buildings and plant it is a suitable industry for those districts where sufficient milk cannot be conveniently collected in order to run a creamery or separating station at a profit.

Ireland is a large supplier of butter, eggs, and bacon to Great Britain. There is no reason why cheese should not be added to the above list. The market is there waiting for us.

[TABLES.

Table XII.

Prices which could be paid for milk without profit or loss when manufacturing butter.

Price of butter per cwt. F.O.R. less cost per cwt. for manufacturing (average cost = 12*s.* per cwt.)		Per cent. fat in milk.						
		3·00	3·25	3·50	3·75	4·00	4·25	4·50
		Yield of butter per gallon, lb.						
		·347	·377	·407	·437	·467	·497	·527
		Price which can be paid for milk in pence per gallon. Separated milk to the amount of 80 per cent. of the whole milk and 5 per cent. of buttermilk being returned free to the farmer and not included in the price.						
Per cwt. *s.* *d.*	Per lb. *d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
93 4	10	3·47	3·77	4·07	4·37	4·67	4·97	5·27
95 8	10¼	3·56	3·86	4·17	4·48	4·79	5·09	5·40
98 0	10½	3·64	3·96	4·27	4·59	4·90	5·22	5·54
100 4	10¾	3·73	4·05	4·38	4·70	5·02	5·34	5·67
102 8	11	3·82	4·15	4·48	4·81	5·14	5·47	5·80
105 0	11¼	3·90	4·24	4·58	4·92	5·25	5·59	5·94
107 4	11½	3·99	4·33	4·68	5·02	5·37	5·72	6·07
109 8	11¾	4·08	4·43	4·78	5·13	5·49	5·84	6·21
112 0	12	4·16	4·52	4·88	5·24	5·60	5·96	6·34
114 4	12¼	4·25	4·62	4·99	5·35	5·72	6·09	6·47
116 8	12½	4·34	4·71	5·09	5·46	5·84	6·21	6·61
119 0	12¾	4·42	4·81	5·19	5·57	5·95	6·34	6·74
121 4	13	4·51	4·90	5·29	5·68	6·07	6·46	6·87
123 8	13¼	4·60	4·99	5·39	5·79	6·19	6·59	7·01
126 0	13½	4·68	5·09	5·49	5·90	6·30	6·71	7·14
128 4	13¾	4·77	5·18	5·60	6·01	6·42	6·83	7·28
130 8	14	4·86	5·28	5·70	6·12	6·54	6·96	7·41

To include value of separated milk and buttermilk add ·8*d.* per gallon. The value varies with the price obtainable for pigs, etc., and the cost of other feeding stuffs, it may be worth double or treble the figure given, which must be looked on as a minimum value.

Table XIII.

Prices which could be paid for milk without profit or loss when manufacturing Caerphilly whole-milk cheese.

Price of Caerphilly cheese per cwt. F.O.R. less cost per cwt. for manufacturing (average cost=6*s.* per cwt.)		Per cent. fat in milk.						
		3·00	3·25	3·50	3·75	4·00	4·25	4·50
		Yield of cheese per gallon of milk, lb.						
		1·021	1·092	1·162	1·232	1·303	1·372	1·443
		Price which can be paid for milk in pence per gallon. Whey to the amount of 80 per cent. of the whole milk being returned free to the farmer and not included in price.						
Per cwt. *s.* *d.*	Per lb. *d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
37 4	4	4·08	4·37	4·65	4·93	5·21	5·49	5·77
39 8	4¼	4·33	4·64	4·94	5·23	5·53	5·83	6·13
42 0	4½	4·59	4·91	5·23	5·55	5·86	6·18	6·49
44 4	4¾	4·84	5·19	5·52	5·85	6·19	6·52	6·85
46 8	5	5·10	5·46	5·81	6·16	6·51	6·86	7·21
49 0	5¼	5·36	5·73	6·10	6·47	6·84	7·20	7·57
51 4	5½	5·61	6·00	6·39	6·78	7·16	7·55	7·93
53 8	5¾	5·87	6·28	6·68	7·08	7·49	7·89	8·29
56 0	6	6·12	6·55	6·97	7·39	7·82	8·23	8·66
58 4	6¼	6·38	6·83	7·26	7·70	8·14	8·58	9·02
60 8	6½	6·63	7·10	7·55	8·01	8·47	8·92	9·38
63 0	6¾	6·89	7·37	7·84	8·32	8·79	9·26	9·74
65 4	7	7·14	7·65	8·14	8·63	9·12	9·60	10·10
67 8	7¼	7·40	7·92	8·43	8·93	9·44	9·95	10·46
70 0	7½	7·65	8·19	8·72	9·24	9·77	10·29	10·82
72 4	7¾	7·91	8·46	9·00	9·55	10·10	10·63	11·18
74 8	8	8·16	8·74	9·30	9·86	10 42	10·98	11·54

To include value of whey add ·4*d.* per gallon. The value of whey varies with the price obtainable for pigs, etc., and the cost of other feeding stuffs, it may be worth double or treble the figure given which must be looked on as a minimum value.

Table XIV.

Prices which could be paid for milk without profit or loss when manufacturing Derby cheese.

Price of Derby cheese per cwt. F.O.R., less cost per cwt. for manufacturing (average cost=6*s*. per cwt.)		Per cent. fat in milk.						
		3·00	3·25	3·50	3·75	4·00	4·25	4·50
		Yield of cheese per gallon of milk, lb.						
		·932	·997	1·061	1·125	1·189	1·252	1·306
		Price which can be paid for milk in pence per gallon. Whey to the amount of 80 per cent. of the whole milk being returned free to the farmer and not included in the price.						
Per cwt. *s. d.*	Per lb. *d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
37 4	4	3·73	3·97	4·24	4·50	4·75	5·01	5·22
39 8	4¼	3·96	4·23	4·51	4·78	5·05	5·24	5·45
42 0	4½	4·19	4·48	4·76	5·06	5·35	5·55	5·78
44 4	4¾	4·42	4·73	5·01	5·34	5·65	5·86	6·11
46 8	5	4·65	4·98	5·26	5·62	5·95	6·17	6·34
49 0	5¼	4·88	5·13	5·51	5·90	6·25	6·48	6·67
51 4	5½	5·11	5·38	5·76	6·18	6·55	6·79	7·00
53 8	5¾	5.34	5·63	6·01	6·46	6·87	7·10	7·33
56 0	6	5·57	5·88	6·26	6·74	7·15	7·41	7·66
58 4	6¼	5·80	6·13	6·51	7·02	7·45	7·72	7·99
60 8	6½	6·03	6·38	6·76	7·30	7·75	8·03	8·32
63 0	6¾	6·26	6·63	7·01	7·58	8·05	8·34	8·65
65 4	7	6·49	6·88	7·26	7·86	8·35	8·65	8·98
67 8	7¼	6·72	7·13	7·51	8·14	8·65	8·96	9·31
70 0	7½	6·95	7·38	7·76	8·42	8·95	9·27	9·64
72 4	7¾	7·18	7·63	8·01	8·70	9·25	9·58	9·97
74 8	8	7·41	7·88	8·26	8·98	9·55	9·89	10·30

To include value of whey add ·4*d*. per gallon. The value of whey varies with the price obtainable for pigs, etc., and the cost of other feeding stuffs, it may be worth double or treble the figure given, which must be looked on as a minimum value.

Table XV.

Prices which could be paid for milk without profit or loss when manufacturing Cheddar cheese.

Price of Cheddar cheese per cwt. F.O.R. less cost per cwt. for manufacturing (average cost=6*s.* per cwt.)		Per cent. fat in milk.						
		3·00	3·25	3·50	3·75	4·00	4·25	4·50
		Yield of cheese per gallon of milk, lb.						
		·859	·918	·976	1·036	1·094	1·148	1·212
		Price which can be paid for milk in pence per gallon, Whey to the amount of 80 per cent. of the whole milk being returned free to the farmer and not included in price.						
Per cwt. *s.* *d.*	Per lb. *d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
37 4	4	3·43	3·67	3·90	4·14	4·37	4·59	4·85
39 8	4¼	3·65	3·90	4·14	4·40	4·64	4·87	5·15
42 0	4½	3·86	4·13	4·39	4·66	4·92	5·16	5·45
44 4	4¾	4·07	4·35	4·63	4·92	5·19	5·45	5·75
46 8	5	4·29	4·58	4·88	5·18	5·46	5·74	6·06
49 0	5¼	4·50	4·81	5·12	5·43	5·74	6·12	6·36
51 4	5½	4·72	5·04	5·36	5·69	6·01	6·31	6·66
53 8	5¾	4·93	5·27	5·61	5·95	6·28	6·60	6·96
56 0	6	5·14	5·50	5·85	6·21	6·56	6·88	7·27
58 4	6¼	5·36	5·73	6·10	6·47	6·83	7·17	7·57
60 8	6½	5·57	5·96	6·34	6·73	7·10	7·46	7·87
63 0	6¾	5·79	6·19	6·58	6·99	7·37	7·74	8·18
65 4	7	6·00	6·42	6·83	7·25	7·65	8·03	8·48
67 8	7¼	6·21	6·64	7·07	7·51	7·92	8·32	8·78
70 0	7½	6·43	6·87	7·32	7·77	8·19	8·61	9·09
72 4	7¾	6·64	7·10	7·56	8·02	8·47	8·89	9·39
74 8	8	6 86	7·33	7·80	8·28	8·74	9·18	9·69

To include value of whey add ·4*d.* per gallon. The value of whey varies with the price of pigs, etc., and the cost of other feeding stuffs, it may be worth double or treble the figure given, which must be looked on as a minimum value.

RECLAMATION OF BOG LAND.

The reclamation of bog land which has been successfully carried out in several Continental countries is of more than passing interest in a country like Ireland where there are vast tracts of bog land bearing vegetation which has little or no agricultural value.

In the reclamation of bog land the first step is generally effective draining. Considerable areas of the Irish bogs are little better than swamps, and these would entail an enormous, and in some cases an almost prohibitive expense in draining, clearing scrub, etc., before they could be made into tillage land. There is, however, no need to start on land of this description, as there are extensive areas capable of being easily drained, and in some cases that require no drainage whatever to bring them into profitable cultivation.

The question of providing a supply of farm-yard manure has no doubt proved a deterrent to a number of farmers who might otherwise have taken up the work.

Manurial Experiment.

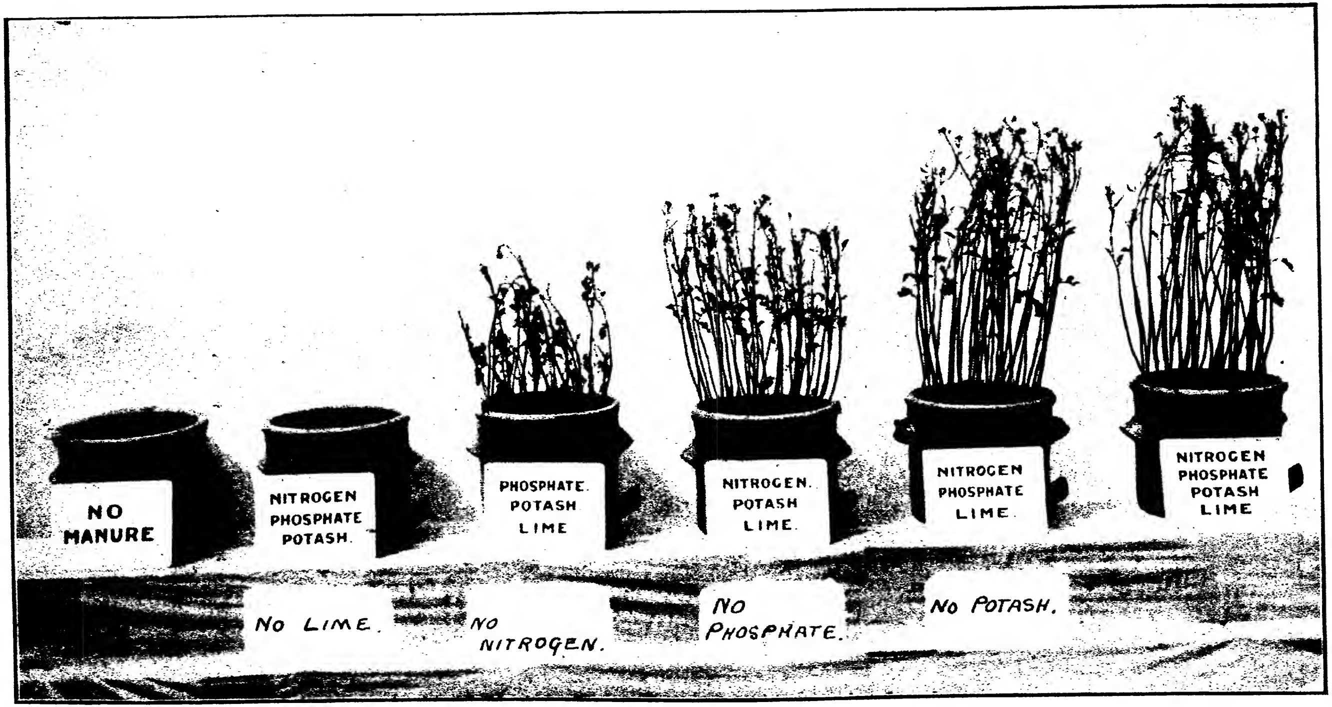
With the object of obtaining information regarding the manurial treatment of Irish bogs, which appear to differ in this respect from the Continental bogs, a series of pot experiments were started in 1918. Samples of peat were obtained from different localities, some from the surface, others from the cut away portion of the bog. With a few exceptions lime was found to be the controlling factor ; in fact in most cases it was found impossible to grow cruciferous crops such as rape without lime, while cereals generally died out after a brief struggle for existence.

The accompanying illustration brings out this fact in relation to cruciferous crops. The crop grown was mustard. (See Fig. 1.)

The first pot, reading from left to right, contains bog in its original state. The four next received three of the following fertilizers, viz., nitrogen, phosphate, potash and lime, while the sixth received the four ingredients. It will be noticed that in the first two pots where there is no lime there is not a single plant growing. They simply died out after the seed germinated. Even the second pot that received nitrogen, phosphate and potash is a complete failure.

Lime essential on Bog-land.

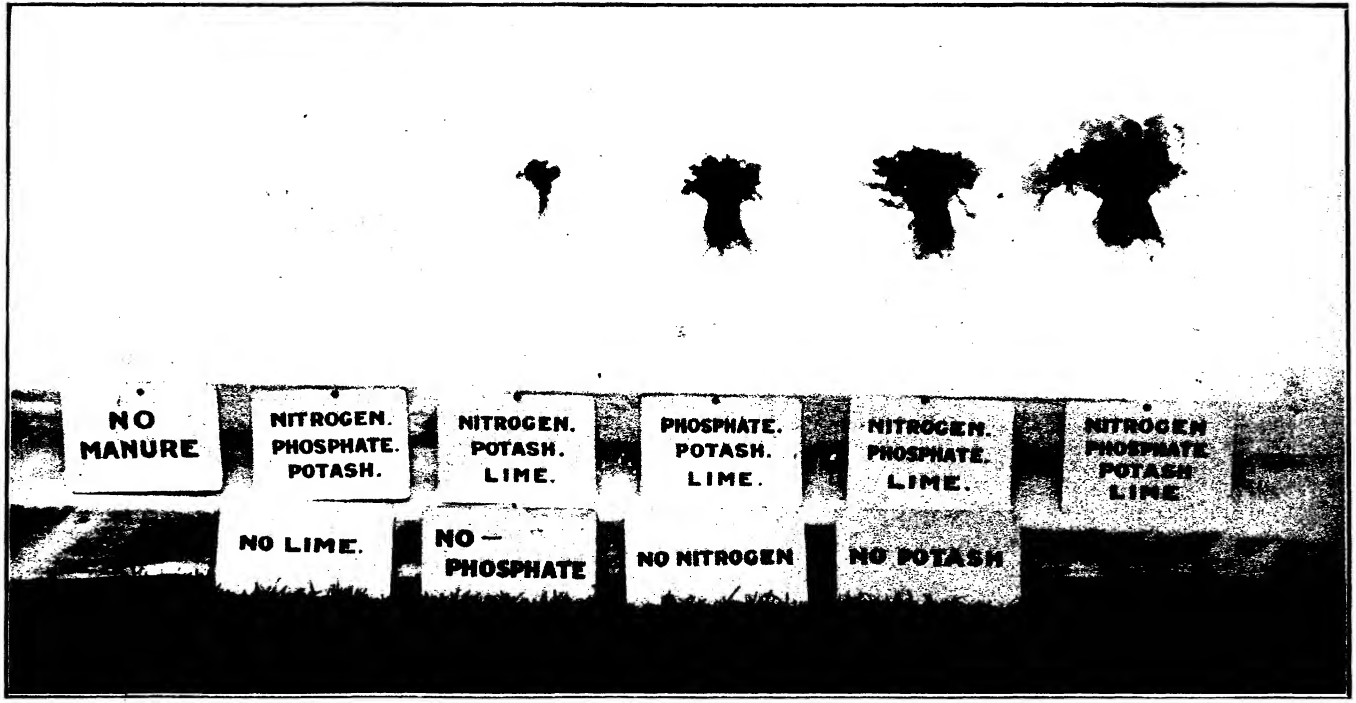
In this first experiment nitrogen was next in importance to lime, but in the majority of cases the effect of the absence of phosphate was more marked than that of nitrogen, while it invariably happened that potash was the least important of



1. 2. 3. 4. 5. 6.

Fig. 1.—Pot Experiment:—Mustard grown on peat soil.

RECLAMATION OF BOG LAND.



1. 2. 3. 4. 5. 6.

Fig. 2.—Rape grown on unreclaimed bog on the Bog of Allen.

the four ingredients. The Irish bogs tested differ in this respect from some of the American bogs where potash is the "limiting factor."

One of the exceptions already referred to where lime was not the controlling factor was a sample of subsoil from a bog at Esker, near Athenry, County Galway, which had been reclaimed some time ago. In this case the lime not only did no good, but was actually injurious.

Experiment in Bog of Allen.

In the summer of 1914 an experiment on a small scale was put down in the Bog of Allen near Naas, Co. Kildare. Earlier in the season a sample of this bog had been tested in pots, and showed such remarkable results, more especially as regards the use of lime, that it was decided to carry out a test on the bog *in situ.*

The part of the bog from which the sample used in the pot experiment was taken, and where the experiment was carried out had been cut away some years ago, but there were still several feet of pure bog left on which heather and other plants commonly found on bogs were growing. The bog is spoken of locally as red bog. It was dug over during the previous winter, and left to weather with the intention of growing a crop of potatoes in 1915.

The analysis was as follows:—

Water	16·87 per cent.
Organic matter	79·21 ,,
Calcium Oxide (C_aO)	·19 ,,
Nitrogen (N)	·31 ,,
Potash (K_2O)	·026 ,,
Phosphoric Acid (P_2O_5)	trace

Six plots of ¾ sq. perch each were prepared on similar lines to the pot experiments, viz.:—

No. 1 Control	Neither manure nor lime.
No. 2 Nitrogen, phosphate and potash	No lime.
No. 3 Nitrogen, potash and lime ..	No phosphate.
No. 4 Phosphate, potash and lime ..	No nitrogen.
No. 5 Nitrogen, phosphate and lime	No potash.
No. 6 Nitrogen, phosphate, potash and lime.	

Manures were applied at the following rate per statute acre:—

¾ cwt. Nitrate of soda.
¾ cwt. Sulphate of ammonia.
6 cwt. Superphosphate (35 per cent.).
3 cwt. Kainit.
2 tons burnt lime.

Each plot was subdivided transversely into three plots of ⅓ sq. perch each.

Notwithstanding the lateness of the season (20th June) the following crops were sown :—

Rape.
Rye.
Potatoes.

The following plan shows how the plots and crops were arranged :—

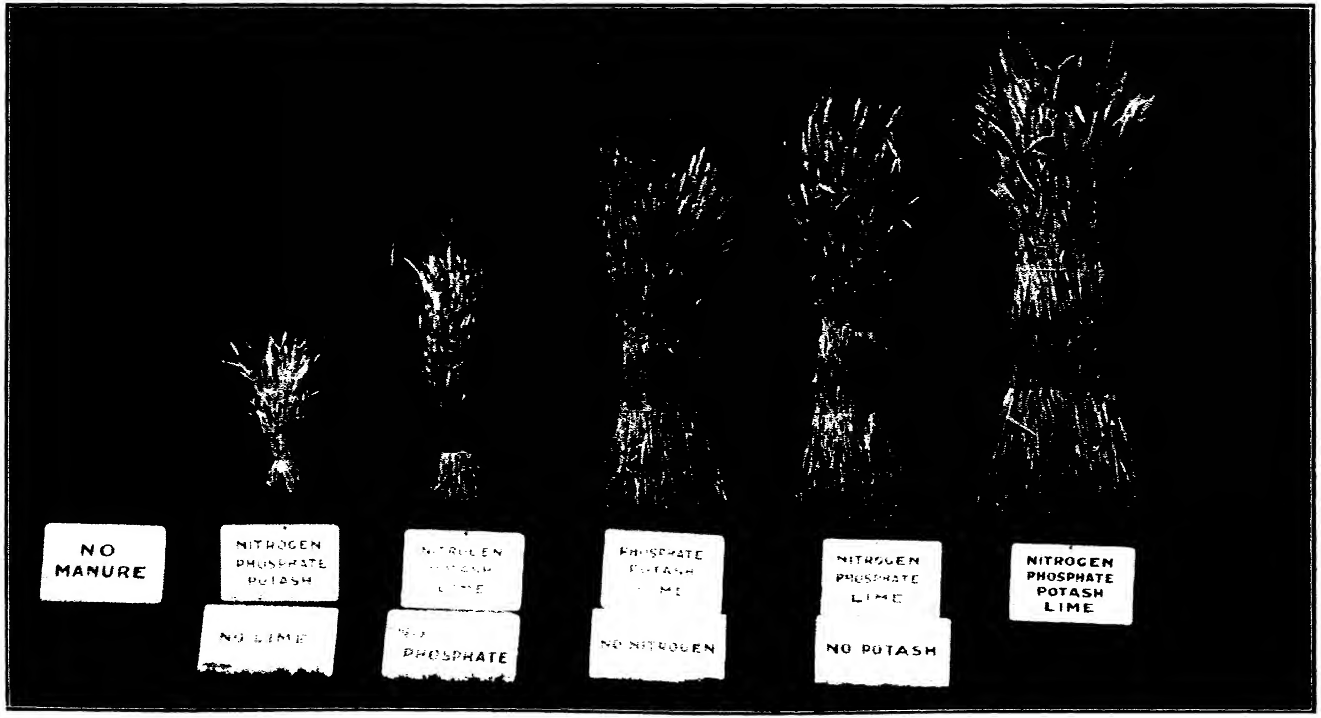
Rape.	Rye.	Potatoes.
No treatment	No treatment	No treatment
Nitrogen Phosphate Potash	Nitrogen Phosphate Potash	Nitrogen Phosphate Potash
Nitrogen Potash Lime	Nitrogen Potash Lime	Nitrogen Potash Lime
Phosphate Potash Lime	Phosphate Potash Lime	Phosphate Potash Lime
Nitrogen Phosphate Lime	Nitrogen Phosphate Lime	Nitrogen Phosphate Lime
Nitrogen Phosphate Potash Lime	Nitrogen Phosphate Potash Lime	Nitrogen Phosphate Potash Lime

The results obtained from the different crops and manures are shown in the accompanying illustrations. (See Figs. 2, 3, 4 and 5).

Rape.

The young rootlets of the rape, on the untreated plot, and those on the plot that received no lime, appeared as if burnt up as soon as the seeds germinated, with the result that not a single plant lived. The plants on plot No. 3 made very little growth while those on plot No. 4 did but slightly better. The want of potash was not nearly so marked as the want of the other ingredients, but the plot without potash was considerably behind No. 6 that received a complete dressing of artificial manure and lime. The plots that grew a crop suffered more or less from the dry season, and even No. 6 did not make a full crop.

RECLAMATION OF BOG LAND.



1. 2. 3. 4. 5. 6.

Fig. 3.—Rye grown on unreclaimed bog on the Bog of Allen.

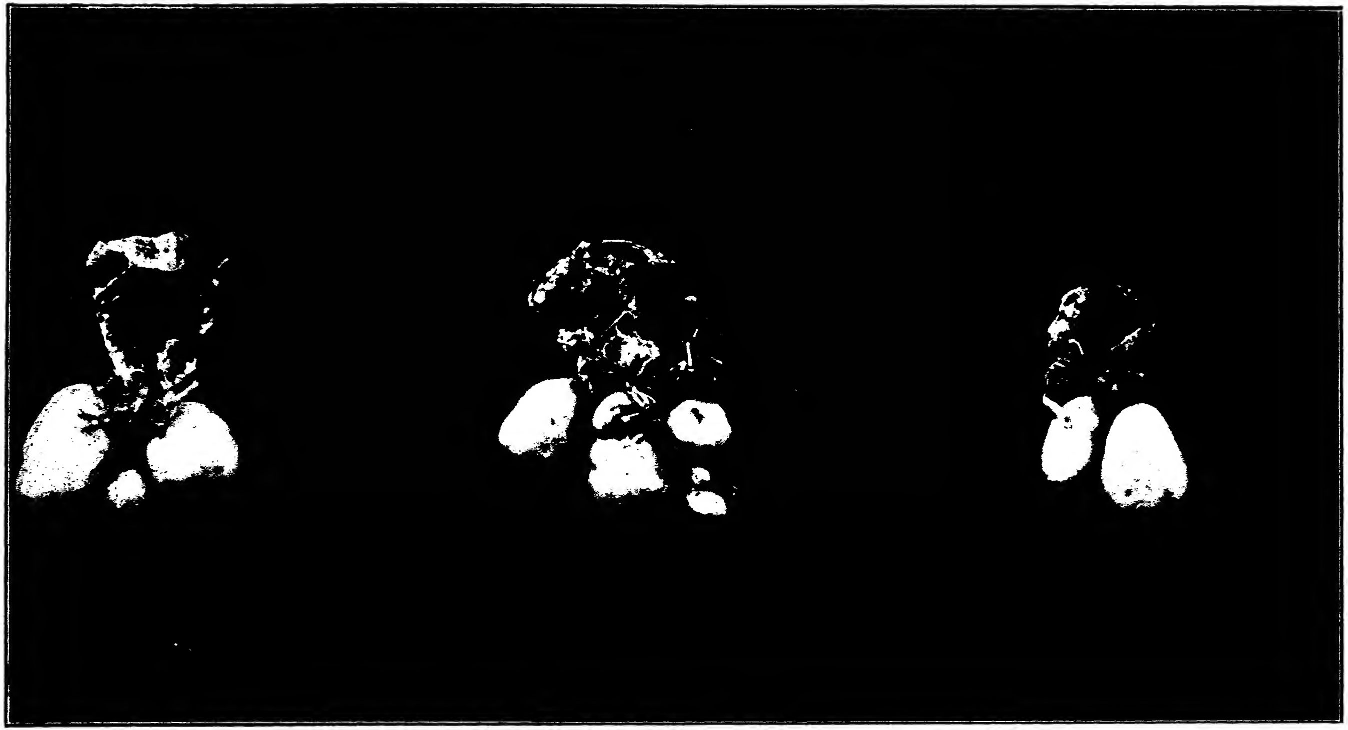


Fig. 4.—Young potatoes attached to old tubers.

Rye.

On the untreated plot the rye germinated, and came through the ground with a dark purple colour, but died out shortly afterwards, and like the rape was a complete failure. Plot No. 2 that received no lime made a few stunted ears which, however, produced no grain. Plot No. 3 was slightly better than the last, and produced a few shrivelled grains on some of the ears. Plots Nos. 4 and 5 made a fair growth, but the grain was only partially filled, none of it being better than tailings. No. 4 tillered better, but the straw was longer on No. 5. Plot No. 6 made a fairly good crop both as regards grain and straw when the time it was sown is taken into account.

The following figures show approximately the total yield per statute acre both as regards grain and straw :—

	C.	Q.	LB.
No. 1. Untreated	0	0	0
No. 2. Nitrogen, phosphate and potash ..	0	2	14
No. 3. Nitrogen, potash and lime	3	0	14
No. 4. Phosphate, potash and lime	15	1	0
No. 5. Nitrogen, phosphate and lime ..	16	1	14
No. 6. Nitrogen, phosphate, potash and lime ..	27	1	14

Potatoes.

In the potato experiment the seed used was the Up-to-Date variety unsprouted and whole. On the untreated plot (No. 1) not a single stalk appeared above ground. Notwithstanding this fact every potato planted produced young tubers which varied from three to ten at each root. Fig. 4 shows three of the old potatoes planted with the young tubers attached.

The total quantity lifted from $\frac{1}{4}$ sq. perch was $3\frac{1}{2}$ lb., equal to 1 ton per statute acre. The weight of seed planted was not ascertained, but it could not have exceeded 2 tons per acre, so that at least one half of the seed set was recovered.

There was very little difference between Plots Nos. 2 and 3 (see Fig. 5) that received no lime and no phosphate respectively. This experiment indicates that the potato is less dependent on lime than either rape or rye on land of this description, and that a deficiency of phosphate is as great a drawback as a deficiency of lime. On the no nitrogen plot (No. 4) the yield was slightly better. Although the analysis of the peat shows a very small quantity of potash, its absence is less felt than that of any of the other ingredients. Had the potatoes on the No. 6 plot that received a complete dressing of manure and lime been planted at the usual time or had they even been sprouted when planted

on 20th June, they would in all probability have made nearly a full crop.

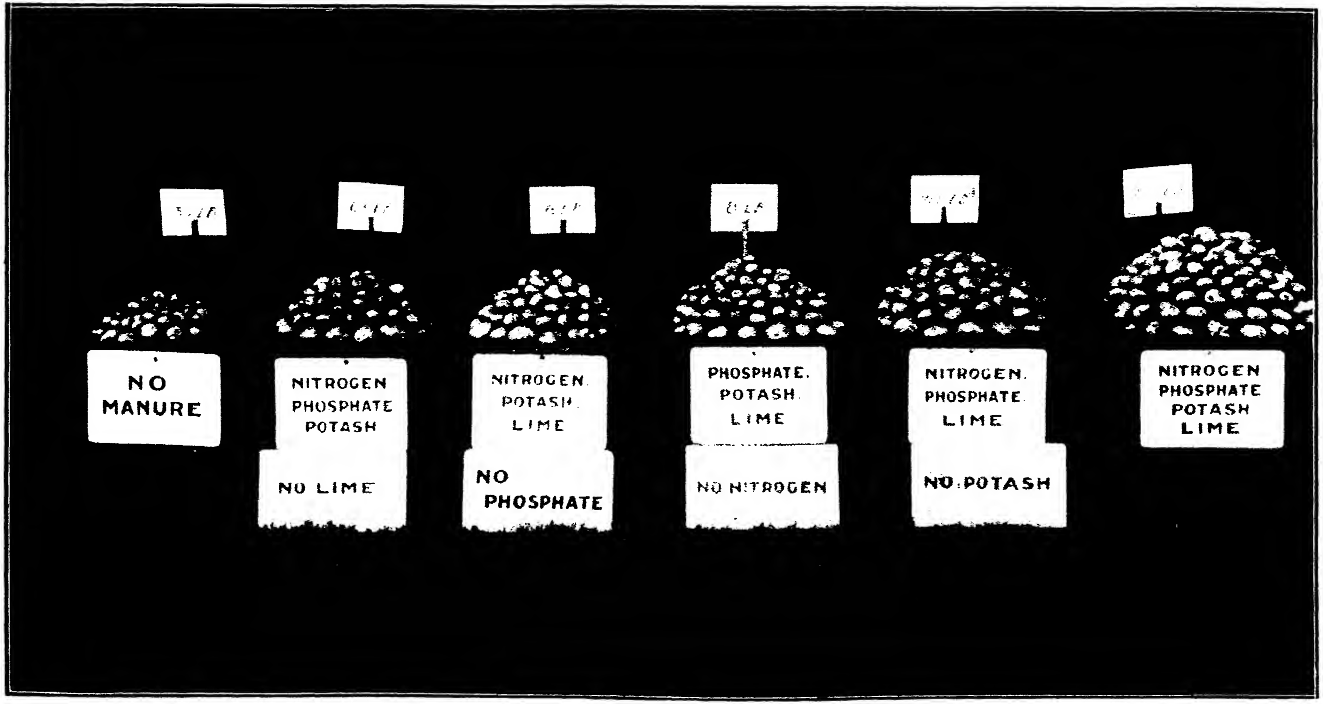
The following figures show the approximate yield per statute acre :—

	T.	C.	Q.
No. 1. Untreated	1	0	0
No. 2. Nitrogen, phosphate and potash ..	1	17	0
No. 3. Nitrogen, potash and lime	1	14	0
No. 4. Phosphate, potash and lime	2	15	3
No. 5. Nitrogen, phosphate and lime ..	3	0	0
No. 6. Nitrogen, phosphate, potash and lime ..	5	0	0

When the short time the peat had to weather after it was dug over and the lateness of the season when the crops were sown are taken into account the results taken may be considered fairly satisfactory for a first crop. It would appear that fair crops can be grown on some classes of unreclaimed bog land with artificial manure and lime without the use of farm-yard manure, provided the mechanical conditions as regards moisture are favourable.

These tests are being continued.

RECLAMATION OF BOG LAND.



1. 2. 3. 4. 5 6.

Fig. 5.—Potatoes grown on unreclaimed bog on the Bog of Allen.

CROP REPORT—MID-JULY, 1915.

The cold, dry weather of May was continued during June, and the extended drought proved a great check to the growth of all crops. In some districts notwithstanding—notably in Cork, Waterford, and other southern counties—rain fell at intervals during May, and these districts were not in so parched a condition as other parts of the country at the beginning of June. Consequently complaints about the burned state of pasture and the lightness of the hay crop have not been general from that quarter. Besides the drought which was general over most of the country during the first three weeks of June, the temperature during the same period kept unseasonably low and frost was experienced in various districts on the nights of the 19th, 20th, 24th and 28th June. The effect of this was most severely felt in the Midlands, where considerable injury was done to the potato crop, especially on low lying moory soils. At 20th June in some districts, and in others at the 22nd and 25th, a change to rainy conditions set in and the benefit of this has been very much felt by all crops.

Cereal Crops.

Of the three leading cereal crops, wheat appears to have suffered least from the long drought and barley likewise has been little affected. Autumn sown fields of wheat look specially promising, and small plots even on poorish soils are surprisingly good at this stage of the season. As a rule autumn or winter sown wheat is much superior to spring sown fields, which are inclined to be patchy. The Oat crop on light land suffered severely from drought and the effect of this has been to cause premature shooting. The crop will be exceedingly light in straw, though some growth may be expected as a result of the recent rains. There are occasional good fields after lea on rich land over a moist sub-soil : fields after manure are mostly thin and short. The crop has the appearance of ripening early. In some counties charlock has infested the crop more aggressively than usual. Barley is described as a fair crop, but as in the case of Oats the rain came too late for a heavy straw return. Rye has been grown on small patches, principally on peat, where the damp nature of the soil enabled the crop to go ahead during the dry weather and is up to average.

Potatoes.

The potato crop looks exceptionally healthy and so far little appearance of blight has been reported. In some districts of the Midlands, the frost during May and likewise in June gave a severe check to fields on low-lying situations, but it is expected

that the recent rains will promote rapid growth again. Already spraying is very general, though in some counties it is said to be less practised than usual at this stage owing to the crop being insufficiently advanced in growth, as well as the fact that all available farm labour is required for harvesting the hay crop; many growers moreover are waiting for drier weather before beginning to spray.

Turnips and Mangels.

Owing to the nature of the weather in May and early June great difficulty was experienced this year in securing healthy brairds of turnips and mangels. As a rule turnips sown early in May did best, and many of these are now singled out; those sown late in May or early in June failed in most cases and sowing had to be repeated two or even three times. The combined effects of drought as well as of frost and fly attack have given growers great trouble in getting the crop started. By far the largest proportion of the crop is very backward for mid-July, but the rains of the past fortnight will be of great help to revive it and promote growth. Mangels, which were mostly sown early, have done well and fields look promising; on the whole the crop shows promise of being good though, while benefited considerably by the recent rain, it now requires heat.

Flax.

Reports show that the flax crop generally is very uneven and patchy and many fields are very short. Fields on heavy clay bottoms look best, while those on dry situations are light and uneven. The crop as a whole will be much benefited by the rains of the past fortnight. Many fields are now in full flower though very short in stalk.

Hay.

Except in some southern counties which were especially favoured by showery weather during the period when the drought was general over the rest of the country, fields of first crop hay are stated to be exceptionally light. A small portion of the crop in the earlier counties was cut and saved before the rain came at the 20th June; considerable trouble has been experienced in saving fields which have been cut since, and in some cases the crop has been much damaged by exposure to wet. As a rule cutting was deferred later than usual in order to let the crop benefit by the effects of the rain. Old meadows, which were very light in appearance up to the middle of June, are improving fast since the rain fell and are expected to cut an average crop.

Pastures.

At the middle of June pastures were showing the severe effects of continued drought and carried very little keep for stock. The rain benefited the grass lands perhaps more than any other crop, and these showed immediate response to the moister conditions. Notwith-

standing the shortness of feed, cattle are stated to have thriven well, but are expected to do better since grass has become more plentiful. Dairy cows which went off in milk yield considerably at early June are again giving full supply. The complaint is general that grazing cattle have been much annoyed by "the fly": sheep have also suffered more than usual from maggotting.

Prices.

Prices for beef cattle and sheep are extremely high; lambs are also selling well and in some districts have fetched 38*s.* each on the farm. Wool is quoted at 1*s.* 9*d.* per lb. for best hogget, and 1*s.* 6*d.* per lb. is a general value. Pork prices have dropped a little within the last fortnight but are still high and likely to re main firm. Bonhams or young pigs are in keen demand: two to three months old bonhams are fetching £2 2*s.* to £2 5*s.* in Co. Clare, and in Co. Cavan young suckling pigs 6 to 8 weeks old are fetching from £3 5*s.* to £3 15*s.* per pair. Suckling calves are also exceptionally dear and in some places are said to be fetching as high as £5 5*s.* Prices for store cattle slackened off somewhat during June owing to the shortage of grass, but are likely to become firm again since rain has fallen. Springers and milch cows are selling exceptionally well: 2½-year old springers are fetching as much as £20 per head. Strong young horses to do farm work are scarce and dear: three-year old animals of this class are in some cases fetching up to £60.

In the following pages detailed information as to the various counties is given.

Leinster.

Co. Carlow.

Winter sown fields of wheat are good; the spring sowings are backward and patchy. The oat crop is very short in straw, but appears well headed; it has been much improved by the recent rains. Barley is a promising crop. Potatoes look healthy. Turnips are very uneven; early sown fields did best and are being singled out. Mangels are good and doing well now. There is a light yield of hay; cutting was not generally begun as early as usual owing to broken weather. Pastures were bare till the rain came, but are much improved since. All live stock are healthy; store cattle are likely to be scarce in the autumn owing to the heavy selling of young cattle in the spring and early summer.

Co. Dublin.

Wheat is now shot out and is doing well; straw will be short. Oats are doing well but short in straw; some forward fields have been badly laid by recent rain. Barley is less grown than usual but looks healthy. Early potato varieties were not raised as early as in

other years, and the yield was below average in some districts; the recent rains have brought about a great improvement in the main crop. Early sowings of turnips have done well and are now thinned; late sown fields were badly checked by drought and fly attack. Mangels are a good hit and are mostly thinned and hoed. Cabbages planted recently are now doing well. First crop hay is yielding barely average. Second crop hay and old meadow are light owing to the dry weather in May. Pastures have been bare till recently; many of them were grazed on earlier than usual owing to the scarcity of fodder this spring. Cattle are doing well.

Co. Kildare.

Wheat does not appear to have suffered from the long drought and promises an excellent yield. Oats have lengthened out well since recent rain; the crop suffered severely on light lands; except on very good soils the straw will be short. Barley is very fair and promises a full crop. Rye looks good. Potatoes have a very healthy appearance; spraying has not yet begun; there has been no appearance of blight. Turnips, where sown early, are very good and growing fast; such fields are nearly all thinned; the later sowings missed in many cases and re-sowing was necessary. Mangels are a particularly good hit but require heat. Carrots are good. Most of the first and second crop hay was made up before the weather broke and is of excellent quality, though the yield was light; fields cut since are suffering from the broken weather; old meadows are fair on good land; all these have been much improved by the rain. Pastures on light soils were badly burnt up near the end of June, but are much improved since; the extreme dearness of store cattle prevented them from being over stocked; good cattle are scarce and young cattle especially are very dear; every calf is being practically reared this season.

Co. Kilkenny.

Wheat is now in ear and will be a good average; there is more of this crop sown than in former years. The oat crop is short in straw but appears well headed; it has been much improved by the rain and may yet turn out average. Barley was not seriously affected by the long drought; the crop is fair. Potatoes have a good show of tops and the prospects are excellent; late planted fields on light tillage soils are rather backward. Early sown fields are good; late sowings are patchy, but are now coming away since the rain occurred. Mangels are on the whole good, they are all mostly singled out and are now growiug fast. Cabbages which were much delayed in growth are now coming along well. Hay will be under average; first crop has been practically saved; second crop is

light in yield, old meadows are improving. Pastures were bare and parched before the rain ; many of them are much under-stocked. Dairy cows dropped in milk yield during June. Cattle are very dear ; wool is bringing a good price, and butter, poultry and eggs are fetching winter values.

King's Co.

Wheat looks well. The oat crop has been much improved by the rain of the last weeks, but straw will be short. Barley is growing well, but, like the oat crop, the rain came rather late for a heavy straw yield. Rye plots are good. Potatoes are much improved lately and promise well. Turnips are making fair progress ; early sown turnips are all hoed and are covering the ground fast. Mangels look healthy and well. Cabbages are an excellent crop. First and second crop hay is light and is just being cut. Pastures are now much improved and stock are thriving well ; the prospect of feeding at this stage is much better than last year.

Co. Longford.

Wheat has been more generally sown than previously ; the crop looks very promising. Oats are somewhat short on light soil ; the recent rain has caused a great improvement. Rye, where sown, is a good crop. Potatoes look well especially on upland soils ; some of the crops on moory land suffered from frost ; spraying does not appear to be so general as in previous years. Turnips are making good progress ; some fields have been thinned. Mangels are excellent, especially where sown early. The hay crop is light ; fields of first crop hay cut since the rain are suffering severely. Meadows are now improving fast. Pastures were much burnt up on dry situations ; these are now well covered. Live stock of all kinds are very dear.

Co. Louth.

Wheat has continued to do well and suffered least from the long spell of dry weather. Oats got badly stunted from the drought, but are now much helped by the rain ; there is a considerable appearance of smut in some districts. The area under barley is much less this year ; the crop promises well. Recent rains have helped the growth of potatoes ; very little spraying has been done so far. A good proportion of the turnip crop has been singled and is doing well. Mangels are coming on splendidly and will be helped by the rain. A good deal of the first crop hay was cut and saved before the change in the weather ; fields cut since are considerably damaged ; very few second crop fields have as yet been cut ; the crop all round may be up to average. Pastures were very bare till the rain came, and live stock in consequence were short of keep.

Co. Meath.

Wheat offers to be good and is in full ear, especially winter sown fields. Oats suffered greatly from the dry weather and are short in straw; the crop will be improved by the rain; most of it is now shot. Fields of barley promise well. Rye is not much grown except on moory soils and is doing well. Potatoes are growing fast since the rain fell and promise to be a good crop. There has been little spraying done owing to unfavourable weather; in some districts late frost did some damage to the crop. Early sown fields of turnips are doing well and nearly all thinned out; later sowings suffered much from drought and fly attack, and are just now coming over ground. Mangels are a very good hit and doing splendidly all over. Cabbages are not good, but promise better now. First and second crop hay is not heavy; most of it is in pike though some is in fork cocks, and some still on the spread owing to the rainy weather. Old meadows would have been light but for the rain; they are now improving, as also is pasture, which was parched and burnt up in many places. Stock are putting on condition; in some districts cattle were badly disturbed in the fields by the fly.

Queen's Co.

Wheat sown early in the autumn under good conditions has done splendidly, and is an excellent crop. Oats did very badly up till the rain came; many fields were so short that it looked impossible to cut them with the binder. Barley looks well, and is now almost fully shot out. The appearance of the potato crop is excellent; little spraying has as yet been done owing to the broken weather; a frost on 19th June did some damage to the low-lying fields on moory soil. Some fields of turnips look exceedingly well and are almost closing the drills; other fields are backward but will improve now. Mangels are all thinned out and look well for the time of year. Cabbages are now growing satisfactorily. Hay is very light all over, and is scarcely half a crop on some farms; saving has been much delayed by the weather. Pastures are now much greener and better covered. Cattle have done well even though grass was scarce.

Co. Westmeath.

Wheat is a very promising crop, with the exception of some late spring sown fields. Oats are somewhat under average in appearance owing to the June drought, and have shot into ear fully twelve days earlier than usual; the yield of grain is expected to be up to average. Barley and rye are both fair but little grown. On all classes of soils potatoes are excellent; moorland crops were slightly injured by frosts in June but are recovering rapidly. Turnips in most

cases are poor owing to drought and fly attack ; the rain has helped the crop considerably. Mangels are excellent. Cabbages were much checked by drought ; the crop is now growing well. Carrots and parsnips wherever sown are good. Very little hay has yet been saved ; old meadows are light in general except on moory land. Pastures suffered most from the prolonged drought but are now recovering rapidly. Cattle did not thrive during June though sheep were not affected by the drought. All classes of stock are fetching high prices.

Co. Wexford.

Some fields of wheat are thin, but fields sown early in autumn are good ; the area under this crop is much larger than usual ; spring sown fields are just now at the shooting stage and straw may be average owing to the rain. Winter oats are healthy but shorter of straw than usual. Spring oats were very poor during June, and in some cases fields were affected with mildew and rust ; the rain has caused good growth, and there may be a fair return of straw yet. Barley grew well from the start and has an excellent appearance ; there is a large shrinkage in the area under this cereal. Field beans promise excellently. Potatoes as a rule were not planted so early as usual, but have done well for the time, and, given favourable weather, should yield up to average. Early sown turnips are very good ; later sowings are irregular but are growing well now. Mangels are promising. Cabbages are poor, though occasional good plots are to be seen. First crop hay is a good average, though much of it has been damaged in saving. Second crop hay and old meadows are likely to be under average. Grass is growing well on pastures, which are now well covered. Cattle, though fewer in numbers, look healthy and are in good condition.

Co. Wicklow.

Wheat is now in full flower, and promises to be a very productive crop. Oats looked short till the rain came, but will stretch now at the shooting stage and turn out a fair yield. Barley is less grown than last year but looks well at present. Potatoes in most places are looking well ; there is no sign of blight so far, and spraying has not yet begun ; in some low-lying districts the crop was slightly injured by night frosts near the end of June. Turnips, where early sown, are now fit for thinning and promise to be a full crop ; in some cases re-sown fields have just been finished and will now be favoured with the rain. Mangels are an even braird as a rule and looking well ; thinning is being done on many farms. Cabbages were very backward till of late, but are now making good growth. Cutting of first crop hay was postponed later than usual owing to the rain ; yield will be average ; old meadows are much improved of late, and are expected to give a good return. Pastures are now

green and afford a good bite for stock. Live stock is healthy and prices are high; prices of store cattle and sheep dropped somewhat in June but have taken an upward turn again.

Munster.

Co. Clare. Winter sown wheat is an exceptionally good crop; spring sown wheat is short and backward, especially on dry soils. The oat crop is poor; straw is short but is expected to stretch with the rain. Only a small area of barley is grown; the crops promises well. Rye looks fair. Potatoes are an excellent crop, except in some districts where fields were badly injured by frost about 20th June. Turnips, where sown early, are fairly good; late sown fields are poor and have suffered considerably from want of rain. Mangels are a good crop generally and are nearly all singled out. Cabbages were poor until recently. First and second crop hay is light; the early cut portion has been well saved; old meadows are carrying light crops. Pasture was very poor on the light limestone soils; it is now beginning to show some greenness. Dairy cows have yielded well, and butter is keeping a good price. Cattle are as a rule thriving.

Co. Cork. Wheat looks remarkably well; the crop is fully eared; winter sown fields are much in advance of spring sown; a few fields have been lodged by rain in some places. Oats are short in general and are now earing out; the crop is growing vigorously of late; lodging has resulted in a few fields. Barley is a satisfactory crop and betokens a full average. Potatoes have grown well from the start and now show a luxuriant growth of foliage; not much blight has been reported yet; spraying has been delayed somewhat by the rain; first earlies and British Queen's are digging a fair crop in the Clonakilty district. Turnips are looking very well at present. and are recovering rapidly from the harsh easterly winds of June. Mangels brairded very regularly and are doing well; this crop wants heat; little trouble was given this season by the Mangel fly. Cabbage is very promising, and is now well suited by the weather. A considerable area of first crop hay has been cut and is at present in various stages of saving; the weather is unfavourable for the work, and some fields have been damaged; yields are a good average. Old meadows are light in general but will be benefited by the rain. Pasture was good in May, but fell off in June owing to the drought; it has improved lately; in many cases it is under stocked owing to the large sale of store stock and the difficulty of replacing. Dairy cows have been milking well, and have not suffered to any extent from the heat. Cattle are scarce in fairs but are selling well. Sheep and lambs are making ex-

ceptional prices; best hogget wool is realising 1*s*. 9*d*. per lb. Pork has fallen from 79*s*. to 74*s*. per cwt. dead weight. Bonhams and light stores are in good demand though prices receded a little lately.

Co. Kerry. A fair crop of wheat is expected on the whole; some of the spring sown fields are not good. Much of the oat crop is short but may yet yield fair; fields on low-lying land are backward. Barley will be a good crop especially on light land. Rye is doing fair on deep moorland soils. The potato crop is doing well and showing heavy foliage; no appearance of blight and spraying is general. Early sown turnips are well ahead; much of the mid-season sowings failed or were eaten by the fly and had to be re-sown; these are now doing well since the moisture set in. Mangels are promising a good crop. Cabbages are only fair as yet. First and second crop hay yielded fair, especially first crop; old meadows are fair in some cases though chiefly light. Pasture is improved greatly since the recent rain but was very poor in June. On some farms dairy cattle had to be put on deep meadows; cows were short of their milk supply in June but have recovered again. Fairs are small and prices of store cattle have recently dropped.

Co. Limerick. Winter sown wheat is a good crop, in full ear, and will be ripe early; spring sown wheat is fair. Oats is a thin crop with short straw; the yield of grain may be good judging from the size of the ear. Barley where grown is very good and well headed. Potatoes were checked by the late frosts in June, but the crop now looks well; spraying has been carried out; there has been no appearance of blight. Turnips were much affected by the drought; the recent rains have revived the crop greatly; in many cases re-sowing was necessary. Along with wheat the mangel crop is one of the best of the season; thinning out is general. Cabbages are very good. First and second crop hay yielded very well, and was mostly all saved in splendid condition; old meadows are light as a rule, and the cutting of these has just commenced. Pastures were burned quite dry, especially on light lands, when the rain came at the end of June; they are now recovering their natural greenness. Cows went back in milk somewhat owing to shortage of grass. Prices for stores and pigs have dropped somewhat of late. Wool is fetching a good price.

Co. Tipperary. Winter sown wheat is all eared out and looks promising; the crop gives an indication of a good yield; spring sown varieties are not so forward and are poor in some places. The oat crop is light, though some fields after lea are fair; the crop is in full ear and the yield

of grain may be average. Barley gives excellent promise; the crop is eared out and well headed though straw is short. Potatoes are very promising in general; blight has not appeared, and little spraying has been done owing to the wet weather. Early sown turnips are all thinned and healthy looking; later sowings were checked in the early stages by drought but are now making good progress. Mangels hit very well and are good all over the county. The dry season had an injurious effect on cabbages, but the crop is now recovering. First crop hay is almost all cut and saved; yields were generally good and in some places heavy; old meadows although very much better than last year are still below average; it is expected they will yet improve much in bottom growth. All pasture land was completely without cover until the rain came; it is now freshening up. Store cattle are scarce and dear and fairs are small; newly calved cows are fetching high prices. Dairy cows are giving full yields.

Co. Waterford. There is a larger area under wheat than for many years; the crop is looking well. Oats are variable; the crop is heavy where early sown and on moist retentive soils; recent rains will partially remedy the shortness of straw. The barley crop is very healthy and promises well. Potatoes are forward in growth and stalks very heavy; given a favourable season there should be a plentiful yield; there has been no appearance of blight; spraying is being retarded by the wet weather. Early sown turnips are nearly all thinned; fields sown about the end of May and beginning of June were attacked by fly, but brairds have struggled through in nearly all cases. Mangels have made rapid growth and are now very forward and promising. Cabbages and carrots are good. First crop hay will be well up to the average; about one-third of it was saved before the break in the weather; some fields cut since have been more or less damaged; old meadows promise to be a heavy crop. Pasture is good and well covered, and has been much freshened by rains. Store cattle are selling easier than a month ago. Dairy cows are yielding somewhat over average.

Ulster.

Co. Antrim. The small patches of wheat sown look well. Oats are now growing fast, but some fields will give short crops; there has been some lodging in a few fields; the crop is just beginning to shoot. The few pieces of rye grown are extra heavy. Field beans promise a good return. Potatoes are looking fine, though there are a great many misses in some fields which is attributed to cut seed. It has been difficult to get a good braird of turnips; many fields

have been re-sown; the crop is backward but is making good progress now. Mangels are a beautiful crop and are fast covering the ground. Cabbages are doing well. Carrots and parsnips are fair and have just been thinned. Flax is likely to be good, except where injured by frost in the early stages; fields, however, are variable and are just coming into flower. First crop hay is a fair yield; a good deal has been saved in medium condition, some fields are difficult to save owing to the large bulk of clover. Meadow hay is likely to be an average crop. Pasture is now very good, and there is a great growth of white clover in some fields. Cattle are thriving well, but are not selling quite so dear as three weeks ago. Fairs are extremely small. Milk yield has increased since the rain came.

Co. Armagh.

Wheat is a splendid crop except where late spring sown. Oats are variable; on light land it can scarcely be a good crop; on heavier soils it is rapidly improving since the rain. Potatoes have grown fast since the change; very little spraying has been done in some districts. The turnip crop is being thinned; some fields made a bad braird and had to be re-sown; generally, however, the crop is doing well now. Mangels are very good. Flax fields are well improved of late and will generally be a fair crop; fields sown with old seed have done badly. First year's hay is turning out better than was expected and is an average crop. Second year's hay is filling up in the bottom now; meadows up to the present have been light but are thickening now. Pastures are well recovered, and there is a fine growth of white clover. Live stock are healthy though scarce and fetching high prices. Pigs are plentiful; useful farm horses are dear and hard to get.

Co. Cavan.

Wheat is a good crop generally, though thin in some cases; the crop promises well now. Oats are doing well; on light soils the crop is short owing to drought, it is better on moory lands; it has been much improved by the rains which came at a most opportune time when shooting. Rye is a good crop and well up to the average. Potatoes where planted early are doing well and look splendid; spraying is in progress; a night frost on 19th June did some damage to fields on light moory soils. Turnips are very backward, and in many cases had to be re-sown; the crop has revived much of late. Mangels look well though somewhat patchy. Cabbages are good and much better than last or previous years. Flax looks healthy and has the appearance of yielding well. Hay is light generally, especially first and second crops; a large proportion has been already cut and saved. Meadows are much improved. Pasture

also is better since rain came. Live stock are doing fairly well. Milk yields are somewhat low. Prices of store cattle have fallen since the middle of June. Young pigs are very dear—£3 5s. to £4 per pair; there will be a considerable shortage of porkers this season.

Co. Donegal. The wheat crop is promising now and looks like yielding well. An increased area of oats has been sown; straw will be short owing to the dry weather; late rains have made some improvement. The small area of barley grown looks well. Rye plots are very good in some districts though short and patchy in others. Beans and peas are sparingly grown; in some districts the crop is short and hardly up to average. Potatoes were beginning to fail on light sandy soils but were helped by rain; the crop is good all over; not much spraying has been done; blight has not yet appeared. About one-third of the turnip crop—the early sown portion—has done well; fields sown during the drought had to be re-sown when rain came. Mangels are looking fairly well. Cabbages are not hearting as well as usual. Flax will be short in most cases; much of it is in flower though hardly 12 inches long in stalk; early sown fields will shortly be ready for pulling. First crop hay was good on rich loamy soil, but a light crop on poor land; most of it has been cut and saved. Old meadows will improve much with the rain. Pastures are good now and water plentiful. Prices for store cattle are not so good. Beef is still selling well; sheep and pork are dear.

Co. Down. Wheat is an excellent crop and well cared. The oat crop suffered on light and dry ground and is short in straw; some fields are up to average. Barley is not much sown this season; the crop is light. Beans look well and promise a good return. Potatoes are coming on splendidly; spraying has commenced in some places; there is no sign of blight yet. Turnips look well since the rain came; early sown fields are best; the later sowings suffered from drought and fly. Mangels promise to be a good crop. There are some heavy crops of flax and of a fair length, but a large proportion is short and light. First crop hay cut light, though some fields turned out fairly heavy; meadows may give a better yield than was expected. Pastures are much improved. Cattle are thriving well.

Co. Fermanagh. Autumn sown wheat is very good and yield will be over average; spring sown fields are poor and yields will be short. The oat crop in general is fair; fields on dry hilly land are short; a large proportion of the crop in the county is grown on peaty soil, and on such situations

the crop is excellent. Rye is good. A good deal of injury was done to the potato crop by frost; at present the crop is doing well; spraying is being generally done; no appearance of blight has yet been detected. Turnips are variable; there has been a good deal of second sowing owing to fly attack and the dry weather; the bulk of the crop is now being thinned and doing well. Some fields of mangels are patchy, but the crop as a rule is better than usual at this season. There are some good fields of flax on heavy clay bottoms; the crop is rather short on dry soils. First crop hay is rather small; old meadows are about average or nearly so. Pastures had failed owing to the spell of dry weather but are now improved. Cattle in general are doing well.

Co. Londonderry.

Wheat looks well and is expected to be a good crop. Oats suffered much from drought; there may be an average crop on rich deep soils; the yield of straw will be short on light soils. Rye looks promising. Beans are excellent. No crop has done better than potatoes, which look splendid; spraying will shortly begin; there has been no sign of blight yet. Turnips, in a great many cases, have had to be sown twice and even three times; very little thinning has been done, and really good fields are very few; the crop is doing better of late. Mangels, where early planted, are looking healthy and strong of growth; there has been little trouble from mangel fly. Cabbages are a backward crop owing to the drought. Flax is very patchy and backward for the time of the season; there are some good fields, but many are very poor. First crop hay cut lighter than usual; as the weather broke at cutting time it made it difficult to handle; in some districts a fair proportion was kept for seed; old meadows are recovering well, and are promising to be up to average. Pastures were bare but are now grazing well. Store cattle and beef cattle have been exceptionally dear in price, but both have dropped somewhat within the past two weeks. Springing cows and milch cattle are fairly dear. Black-faced sheep are plentiful. Pigs are dear.

Co. Monaghan.

Wheat is looking splendid though there are occasional thin fields; recent rains have caused considerable lodging. Oats are a good crop on strong damp fields; it is light on dry soils; the rain has improved the crop as a whole. The small patches of rye grown are good. Potatoes are, in general, splendid with plenty of foliage; the recent showery weather has postponed spraying; blight has not yet been reported. Some fields of turnips are very good, others had to be re-sown a second or third time; the crop is now doing well. Mangels are up to the average of other seasons. Flax has been a

disappointing crop; on a few sheltered fields with a damp subsoil the crop is good; on the whole the return looks to be short; an early pulling season is anticipated. First crop hay is light, and saving is made difficult by the showery weather; exceptional fields, however, have given good returns. Meadows are much lighter than usual but improving rapidly. Pastures were bare up till some time ago but are now good. Dairy cattle are milking well. Prices for live stock are good though showing a slight reduction during the past few weeks. Young pigs are selling at unprecedented prices. Pork fluctuated during the last month but prices are high.

Co. Tyrone. The wheat crop is a great success and well headed. Oats are only fair; the crop is thin and short in many cases, except on clay soils, which were well cultivated. Rye, which is not much sown, is good. The bean crop is up to average. The potato crop has a fine healthy appearance of foliage; spraying is in full swing; no blight has yet appeared. Turnips have been a complete failure in some cases and very good in others; a lot of re-sowing has been and is being done; in general the later sown fields look healthy if backward. Mangels are very fair though patchy in places. Cabbages are very good. Flax is variable; in some parts of the county, sowing, it is thought, was done too late to produce good fibre; the crop looks soft and growing. Saving of the first crop hay is being carried out in bad weather; as a rule fields are light and thin, though some may be up to average. Meadows are improved and may yield a fair average crop. Grazing now looks well everywhere. Stock are doing and selling well especially springing cows. Store and beef cattle are cheaper than a month ago. Young pigs and pork are making good prices.

Connaught.

Co. Galway. Wheat promises to be better than normal. Oats on light land and where sown late will be a short crop; on the whole the promise is good. Barley is exceptionally promising. Rye is very good. Potatoes are looking better at this stage than for many years; there are a few patchy fields to be seen; spraying is being carried out; early varieties are digging well. Turnips have been largely re-sown, and the crop in general is backward. Mangels are very forward, and singling is practically completed. Cabbages where planted early are good. First and second crop meadows gave slightly over an average yield of hay which has been saved mostly in good condition. Old meadows on light land were affected badly by

drought; the crop in general will be good. Pastures have done well since the rain. Stock are scarcely average in condition; trade at local fairs has been dull for the past three weeks. An unusually large supply of turf has been saved this season.

Co. Leitrim. Autumn wheat is excellent, the best for many years; spring sown wheat does not promise so well. Oats are rather short but heading well. Barley is an excellent crop where grown. Rye is growing well; some plots have been lodged by the recent rains. Potatoes have made excellent progress of late; some fields on boggy land were injured by frosts in June but have recovered; no blight has yet appeared; spraying is general. Turnips are generally not satisfactory; they are as a rule a late patchy crop; recent rains will help them much. Mangels are good, especially on bogs. Cabbages are fair. First crop hay will be average; cutting is being done; old meadows are rather light. Pastures are much improved. Live stock are doing well and fetching high prices. There is a large increase in the number of mares being bred from this season.

Co. Mayo. Winter sown wheat plots look well now, and promise to be up to average; spring sown fields are variable. Except on light lands oats will be well up to average; on lea land the crop is fair, after roots it is poor; there is a more than usual amount of charlock this season. Barley is average, and was not so much affected by drought as oats. Rye where grown is doing well. Potatoes in general are good; spraying is being widely carried out though the weather is adverse. Early sown turnips are good; later sowings are coming on rapidly. Mangels are doing fairly well; in some districts fields are uneven and backward. Cabbages are, on the whole, an average crop; a large proportion of plants failed during the drought. Flax in the Ballina district is variable; some fields are good and others poor. First crop hay was mostly cut and saved in good condition; on light lands it is below average. Meadows will cut out very light but are improved lately. Pastures are now grazing well; they were variable up to the present. Live stock are thriving and selling well; there was a slight drop in cattle and sheep prices during June. Mountain sheep are 5*s.* per head dearer than last June; lambs are dear, also young sucking pigs.

Co. Roscommon. The wheat crop is good and the head appears to be of more than average length. The recent rain will improve the oat crop which threatened to be short on dry hilly soils. Barley is very little grown; the crop is good. Rye is fair but rather thin on some plots. The

potato crop has not been so promising for years at the beginning of July; early varieties are giving good yields. Turnips were slow in coming, and many plots had to be re-sown; they are now doing well since the rain; May sown plots are doing best. Mangels, as a rule, are looking well, the plants being very regular and healthy. Cabbage has done well during the past fortnight. Most of the first crop hay has been cut and was saved without rain; the yield will be about average. Old meadows were light till the rain came; they are now improving rapidly. Pastures were good during the season except on very light soils. Cattle are healthy, and prices well maintained for all classes of stock.

Co. Sligo.

Wheat, where sown early, is looking very well; spring sowings are short and not all shot yet. Oats are light in straw but the head is good; the present rain will be helpful. Barley is little sown; the crop is just shot out and is looking well. The little rye sown promises a good crop. Early varieties of potatoes will dig out a light crop owing to the frosts in May; maincrop varieties promise excellently. Early sown fields of turnips are singled and doing well; late sowings are backward and thin but improving with the rain. Mangels promise an average crop; early sowings are very good; singling of late sown fields is just completed. Cabbages are doing well and are a good crop. There is a better braird of carrots than usual. First crop hay was light but very well saved. Meadows are backward; the rain will cause them to fill up to average. Pastures are now well covered, and stock are in good thriving condition. Prices are extremely high.

FRUIT CROP REPORT—MID-JULY, 1915.

The following statement is summarised from a series of reports obtained through the courtesy of a number of correspondents and indicates the chief features of this season's Fruit Crop. Although at early spring the prospects of a heavy yield of all kinds of fruit were decidedly bright, the occurrence of severe frosts, especially those on the nights of the 4th and 14th May, did much injury to the blossoms and caused a light set of fruit. Apple trees in exposed situations and black currant bushes were especially affected. The drought of May and June encouraged attack from different forms of aphis, but the rains which came near the end of the latter month did much to benefit all bush and tree fruits. At Mid-July growers were of opinion that sufficient moisture had been obtained, and that the fruit crop as a whole required a return of heat and sunshine.

Leinster.

Co. Carlow.

Gooseberries are very good. Strawberries promised well, but owing to the dry season the crop turned out only medium. Raspberries are a fine yield of fruit. Both red and white currants are fair; black currants are a good crop though affected by drought. Apples in general are plentiful. Pears are variable. There is a very heavy crop of Plums. Damsons promise well. Cherries are good. Insect attacks were severe this season owing to the drought, the chief being from black and green fly as well as the caterpillars of the Codlin moth. Fungoid diseases were much in evidence in some places; the most general of these were American gooseberry mildew, apple scab, and canker. The local demand for fruit was fair; prices obtained in Dublin were: gooseberries 6*d.* to 8*d.* per gallon; strawberries 6*d.* to 8*d.* per lb.; raspberries 2½*d.* to 4*d.* per lb.; black currants 2½*d.* to 4*d.* per lb.

Co. Dublin.

Gooseberries are a very good crop. Strawberries were plentiful. Raspberries are well covered with fruit. Red, white and black currants are all fair crops. Apples are plentiful, but the fruit is small-sized for the stage of the season. Pears are a very uneven crop. There are some good yields of Victoria Plums. The Damson crop is poor. Prices for fruit in the Dublin market were satisfactory: prime strawberries in some cases brought as much as 10*d.* per lb.

Co. Kildare.

Gooseberries were a very heavy crop. The yield of strawberries was above average. Raspberries promise well. Red and white currants are an average crop. Black currants are generally a heavy yield, though bushes in some gardens were badly infested with aphis.

There is a good yield of fine quality apples. Pears are good in some parts of the county. Plums have cropped better than was expected. Damsons are also good. Loganberries are making a fine show of fruit. The Cherry crop is the best for several seasons. Aphis attack was severe on all fruit trees; Codlin moth and gooseberry saw-fly also did much damage. There were a few cases of American gooseberry mildew. Canker is showing on apple trees in many places.

Co. Kilkenny. Gooseberries are an average yield and strawberries over average. Raspberries are variable; there are good crops in some gardens. Red and white currants are better than black currants, which were badly infested with aphis. Apples, though not so heavy a crop as last year, are a good average; Bramley Seedling has cropped best; old orchards have a good set of fruit except in exposed places. Pears, both on walls and on standards, are a good average crop. Plums are variable; the crop in many places is above average; Victoria's have cropped best. Damsons are little grown; the crop is barely average. Crab apples are plentiful all over the county. Loganberries are good. Aphis attack was more than usually severe owing to the character of the weather in June; American blight was prevalent on some old orchards. Prices have been satisfactory.

King's Co. Gooseberries and strawberries are both average crops; all other kinds of fruit are over average. The dry weather of the past two months has caused all fruit to be on the small side, but the recent rains will do good. The most troublesome forms of insect attack were aphis and American blight; there was little or no injury from fungoid attack. Local prices of fruit were: gooseberries 1*s.* per gallon; raspberries 4*d.* per lb.; strawberries 8*d.* per lb.; red and white currants 3*d.* per lb.; black currants 4*d.* per lb.

Co. Longford. The crop of gooseberries is excellent. Strawberries were plentiful, but the fruit was smaller than other years. There is a splendid yield of raspberries. Red, white and black currants are a very good crop; bunches on black currant bushes are smaller than last year. Apples are variable; there are some very heavy crops. There is a fair show of pears on old trees; the yield on young trees is medium. Plums are good, especially Victorias. Damsons also are excellent. Loganberries are carrying a heavy crop and look promising. Cherry trees are well laden. Gooseberry saw-fly and aphis on black

currant bushes and plum trees did much damage. Canker on apple trees is more prevalent than usual. The demand for fruit is chiefly local.

Co. Louth. Gooseberries are a good crop. Strawberries carried well, but the fruit suffered somewhat from drought. Raspberries promise to be heavy. Red and white currants are well up to average. Black currants are poor and suffered more than any other fruit from drought. Apples are average. Pears against walls are good; the crop is light in open situations. There is a fair crop of plums in some districts. Damsons suffered severely from frosts and are poor. Cherries are light in all situations. Green fly was the most troublesome insect pest. There were good prices locally for gooseberries (3*d.* per quart), and strawberries (8*d.* per lb.).

Co. Meath. Gooseberries are an average crop and free from disease. Strawberries also were average. Raspberries are a very heavy crop. Red and white currants range from average to good. Black currants are variable and slightly under average. Apples in sheltered situations will yield an average crop; in other places the fruit was destroyed by late frosts. Pears, as a rule, are indifferent. Plums while fair are much behind last year's crop. Damsons are variable. Loganberries are good. The worst insect pests were American woolly aphis, saw-fly, caterpillars and green fly. Canker mildew gave trouble in some orchards.

Queen's Co. Gooseberries are a plentiful crop of full-sized fruit. Strawberries were mostly an excellent crop. Raspberries promise well. Red and white currants are fine in quality and plentiful. Black currants are medium and were badly checked by aphis attack in June. The apple crop is good and promising. Pears range from medium to heavy. Plums are good and plentiful. Damsons have cropped extra well. The saw-fly did much damage to gooseberry bushes and aphis to black currant bushes. Fruits are mostly disposed of in local markets and prices are variable.

Co. Westmeath. Gooseberries are rather a good crop and above average. Strawberries gave promise of an excellent crop early in the season; drought interfered with the early varieties; later varieties are above average. Raspberries show good promise. Red and white currants are fair to average. Black currants are above average, but the fruit is small in consequence of the dry season. Apples are above average

on well established trees; the following varieties are bearing heavy crops: Bramley Seedling, Lane's Prince Albert, and Newton Wonder. Pears are below average in the open and good on walls. Plums are over average as also are damsons. The caterpillars of the gooseberry saw-fly and of the winter and Codlin moth, as well as black currant mite, were the chief insect pests. American gooseberry mildew, as well as apple and pear scab, were the most troublesome fungoid diseases. Local prices fof fruit were: gooseberries 4*d.* per quart; currants 4*d.* per lb.; strawberries 6*d.* to 8*d.* per lb.

Co. Wexford. Gooseberries were good to average. Strawberries gave an average yield of fruit. Raspberries have done excellently. Red and white currants are fair, but black currants are poor. Apples and pears are below average in yield. Plums and damsons have given a medium crop. Cherries are above average. Fruit trees suffered severely from cold east winds, which scorched the blossoms and the foliage. During the drought aphis attack was very severe; the caterpillars of the winter and ermine moth also gave trouble; in some cases American blight was noticeable. Fruit prices in local markets were: gooseberries 8*d.* to 1*s.* per gallon; strawberries from 1*s.* 6*d.* down to 6*d.* per lb.

Co. Wicklow. Gooseberries are under average in some places; in other gardens the crop is excellent. Strawberries were a variable crop. Raspberries are promising well. Red, white and black currant bushes are all carrying full crops. The crop of apples is deficient this season, and pears, plums and damsons are distinctly bad. Loganberries are a satisfactory crop, and an average crop of cherries has resulted. The most noticeable insect pests were aphides, gooseberry saw-fly, red spider and woolly aphis. Fungoid affections included black rust on pears, American gooseberry mildew and silver leaf on plum trees. Prices for fruit in local markets were: gooseberries 6*d.* to 8*d.* per gallon; strawberries 4*d.* to 6*d.* per lb.

Munster.

Co. Clare. Gooseberries are about an average crop, though poor in some districts. Strawberries returned a heavy yield of fruit. Raspberries promise excellently. Red and white currants where grown are good. Black currants are bearing well. There is a good average crop of apples on both old and young trees. Pears are variable, but in most cases up to average. Plums are a good crop both against walls

and in the open. Damsons are variable in yield. There is a medium crop of fruit on cherry trees. Loganberries promise a heavy yield. Gooseberry saw-fly did much damage in some districts, and plum aphis was also hard to combat; the woolly aphis was very active in the dry hot weather. The chief forms of fungoid attack were: scab and canker on apples. Gooseberries sold at 4*d.* per quart; strawberries opened at 1*s.* per lb., black currants fetched 2*d.* to 4*d.* per lb.

Co. Cork.

Gooseberries range from average to good. Strawberries were an excellent crop. Raspberries have cropped well. Red, white and black currants are over average. The yield of apples is good. Pears are disappointing, but there are some fair crops in places. Plums and damsons are from average to good. Some varieties of apples were severely injured by frosts in May, notably: Alington Pippin, Cox's Orange Pippin and Worcester Permain. Codlin moth was again very troublesome. American blight has appeared but is not as bad as usual. The local demand for fruit was good and prices were satisfactory.

Co. Kerry.

Gooseberries are a very good crop in all districts. Strawberries suffered from drought; late varieties are fruiting well. Raspberries promise well. Red and white currant bushes are well laden with fruit. Black currants were injured by the aphis in May and June but are bearing a full yield. Young and old trees are carrying a good crop of apples. Pears appear variable, though some good trees are to be seen. Plums and damsons are little grown; sheltered trees have done well. Gooseberry saw-fly was the worst insect pest though the winter and Codlin moth were also in evidence. The most noticeable fungoid diseases were apple scab and canker. There is a good local demand for gooseberries at 1*d.* to 3*d.* per quart; strawberries realised from 8*d.* to 9*d.* per lb.

Co. Limerick.

Gooseberries are good. Strawberries and raspberries are fair. Red, white and black currants have all cropped well. There is a good crop of apples, though pears are but medium. Plum trees are bearing full crops. Gooseberry saw-fly and Codlin moth caterpillar were the chief offenders in the insect class. Black spot and canker were the principal forms of fungoid diseases. There is a good demand in all the local markets for bush fruits. Gooseberries are fetching from 1*s.* 9*d.* to 2*s.* per stone; strawberries from 6*d.* to 10*d.* per lb.; black currants 3½*d.* per lb.

The crop of gooseberries is variable and ranges from fair to average.

Co. Tipperary. Strawberries gave a plentiful yield, and raspberries are a full crop. Red and white currants are good in some districts, though a poor crop in others. Black currants are about half a crop. Apples are in general good, though much of the fruit formed was cut off by frosts in the end of May. Bramley Seedlings in most orchards will yield less than last year. Pears are variable and in many instances poor. Plums are only half a crop in some cases. The insect pests most common were woolly aphis and the caterpillars of gooseberry saw-fly.

Co. Waterford. Gooseberries are scarcely average. Strawberries are abundant and good. Raspberries are an over average yield. Red and white currants are an excellent crop. Black currants have yielded well and the fruit is a good quality. Apples are a good average crop; the best cropping varieties are: Bramley's Seedling, Newton Wonder and Lane's Prince Albert. Pears are under average generally. Victoria plums are plentiful; other sorts are a thin crop. Damsons are scarce. Cherries did not set well and are a poor yield. Insect and fungoid attacks were not so troublesome as in other seasons.

Ulster.

Co. Antrim. Gooseberries are carrying fair crops. The crop of strawberries was large but the quality inferior to that of other seasons. Raspberries promise to be good. Red and white currants are a full crop. Black currants are generally bad, but there are exceptional gardens in which the bushes are carrying good crops. The apple crop will vary a good deal; in sheltered situations the yield is well up to average; quality appears good; early eating varieties cropped best. Pears are an average crop, as are also plums and damsons. Insect pests were not so prevalent as in other years except green fly. Apple scab is prevalent but not serious. Not much fruit has as yet been marketed, and consequently it is impossible to quote prices.

Co. Armagh. Gooseberries are barely up to average, and the fruit is smaller than usual. Strawberries were a good crop of large high quality fruit; the earliest varieties were small; the late varieties, which were helped by the timely rains, produced larger berries. Raspberries vary from average to good. Red and white currants are not much grown commercially; the crop is fair. Black currants were badly injured by frosts at 13th and 14th May, and are a deficient crop.

The apple crop is estimated to be only one-third of the usual crop in low-lying orchards, and two-thirds on higher planted situations; the late frosts in May caused much injury to the crop and reduced yields materially. Bramley Seedlings are stated to be a conspicuous failure; Grenadier and Lord Derby varieties and also Bismarck, where grown, are, on the other hand, described as carrying good crops. The pear crop, which is of little importance in the county, will be light. Plums are barely a half crop. Damsons showed a good bloom, but trees as a rule are now carrying little or no fruit. The chief insect pests of the season were: winter, Codlin and Ermine moth, also leaf-curling aphis. There was less fungoid attack than usual, with the exception of Brown Rot, which is most common on apples of the Lord Derby variety. Prices for small fruit were very good. Most of these were sold to Belfast jam factories.

Co. Cavan.

Gooseberries have cropped fairly. Strawberries would have been better but for the drought. Raspberries and currants of all kinds carry fair crops; black currants are poor in some places. Apples are variable; some varieties have cropped well in sheltered situations. Pears are medium. Plums on garden walls are good. Damsons are fair to average. The most common insect pests were: green fly, gooseberry saw-fly and Codlin moth. There was less trouble from fungus attack than usual. Canker is prevalent in some old orchards.

Co. Donegal.

Gooseberries are a good crop generally. Strawberries were fair. Raspberries show a good promise. Red and white currants are thin on the bushes. Black currants are good. The early and late varieties of apples were injured by frost; intermediate sorts escaped and are an average yield. Pears were mostly frosted and are a poor crop. Plums are scarce on the trees. Gooseberries sold at from *7s. 6d.* to *10s.* per cwt. in local markets.

Co. Down.

Gooseberries are an average crop of good quality. Strawberries were a splendid crop; Kentish Favourite and Royal Sovereign were of very fine quality; showery weather at present is damaging some of the finest fruit. The crop of raspberries is very good, and young canes are promising well for next season. Red and white currants are a good average crop. Black currants are only about half a crop; a severe frost when the fruit was setting thinned the bushes greatly. Apples are variable; some varieties have done well and others, such as Bramley Seedling, are about half a crop. Pears

are a miss in some orchards, in others the yield is average. Plums are average to good, especially Victorias. Damsons are hardly average. Loganberries are remarkably good. Aphis was the most serious insect pest, and was very severe on bush fruits and plum trees during the drought in May. American gooseberry mildew was a common fungoid disease. Black spot in apples is not so common this season. Local markets are good, but prices are ruled from Belfast. Good gooseberries fetch 16*s.* to 17*s.* per cwt. in market; fruit for jam factories is worth 10*s.* per cwt.; strawberries are fetching 4*s.* to 5*s.* per dozen boxes.

Co. Fermanagh.

Gooseberries are under average. Strawberries were good. Raspberries promise well. Red and white currants are a full crop, but black currants are carrying barely half the usual amount of fruit. The apple crop is variable, dependent on the situation; old orchard varieties are best; Bramleys are not good except in a few places. There are some good crops of pears, especially on walls. Plums vary from light to fair crops. Damsons are under average. Cherries and Loganberries are good. The most injurious insects were the caterpillars of the gooseberry saw-fly; winter moth also did much harm in old orchards; apple sucker and aphis have not been so much in evidence as in other years.

Co. Londonderry.

Gooseberries are a good crop. Strawberries were plentiful. Raspberries are promising. Red and white currants are fair, but black currants are poor. Apples are a good crop. Pears have set well. Plums are poor, and damsons almost a failure. Local prices for fruit were fair.

Co. Monaghan.

Gooseberries are a splendid crop this season. Strawberries could hardly be described as a good crop owing to the drought. Raspberries are variable. Red and white currants are a very fair average though not so good as last year. Black currants are much under average, and in some districts a total failure. Apples are very good in some parts of the county and under average in others. Pears are a fair yield, but not so plentiful as apples. Plums and damsons are average to good. Among insect pests the caterpillar of the winter and Lackey moth as well as of the gooseberry saw-fly were much in evidence. Aphides were severe on apple and plum trees; apple sucker gave little trouble this season. Apple scab is not nearly so common as other years; canker still remains a source of trouble; a few cases of gooseberry mildew have been reported. Currants and raspberries are usually sold to the Richhill Jam

Factory. Gooseberries are chiefly marketed in Dublin. Gooseberries brought 2*s*. 6*d*. to 5*s*. per kish of 20 quarts; black currants fetched 26*s*. per cwt.

Co. Tyrone. Gooseberries are an average crop of good quality but suffered from frost. Strawberries are a fair crop, but the berries are lacking in flavour; the crop season will be short. Raspberries are showing a fair crop and are improving since the rainfall. Red and white currants are abundant. Black currants are poor and berries small. Apples are below average, especially Bramley's; Grenadier and other early flowering varieties are fair. Pears are only good where well sheltered. Plums are poor in the open. Damsons are mostly poor; in some places there is a fair crop. Cherries are fairly abundant. The principal insect pests were American blight in apples and black aphis on cherry trees; silver leaf on plum and canker on apples were the most noticeable forms of fungoid attack. Gooseberries are selling at 10*s*. to 12*s*. per cwt.; strawberries are fetching about 6*d*. per lb. locally.

Connacht.

Co. Galway. Gooseberries are in general a heavy crop. Strawberries were very fair; the fruit was clean and well-flavoured. Raspberries are fair to good. Red, white and black currants are carrying fair yields. Apples are very variable; some varieties have cropped well. Pears are average. Plums are a surprisingly heavy yield. Gooseberries were badly attacked by saw-fly; American blight was also bad on old apple trees. Canker and gooseberry mildew were the worst fungoid affections. The surplus fruit produce is all disposed of locally.

Co. Leitrim. Gooseberries are an indifferent yield; in some districts a fair crop has been obtained. Strawberries were a light yield. Raspberries promise well. Red, white and black currants are fair. The apple crop is rather poor; some trees are bearing a fair yield. Plums are fairly good. Codlin moth did damage to some apple varieties.

Co. Mayo. Gooseberries are a moderately good crop. Strawberries were a good yield, but fruit was small owing to drought. Raspberries are a satisfactory yield. Red, white and black currants are all fairly good. Apples will not be so good as last year; in most districts the crop is rather light. Pears blossomed well but fruit is scarce. Plums and

damsons are not much grown ; some trees are bearing heavy crops. Cherries and Loganberries did well. Cluster-cup did some injury to gooseberry bushes, and both inseect and fungoid pests were slightly more troublesome than usual. There are only local markets for surplus fruit, and prices were much the same as last year.

Co. Roscommon.

Gooseberries are average; amber varieties are bearing heaviest. Strawberries are good, though there were failures in some places; Leader and Royal Sovereign are the best of the older sorts. Raspberries are an average yield. Red and black currants are a good crop, but berries are on the small side. Apples are a very heavy crop generally, though poor in some places; the fruit is now swelling rapidly especially on young trees, and promises well. Pears and plums are an average crop. Loganberries are bearing heavy crops. The chief insect pests were aphides and gooseberry saw-fly. Canker on apple trees and cluster-cup on gooseberries were the most troublesome fungoid attacks. Markets are local; strawberries varied in price from 6*d.* to 2*s.* per lb.—the average for good fruit being about 10*d.*

Co. Sligo.

Gooseberries are average, but not so good as last season. Strawberries are a fair crop on the whole, and in some places very good; the fruit of the Pride of Kent variety was exceptionally large. Raspberries are a very promising crop and just now ripening. Red, white and black currants are all good. There is a very fine prospect of apples; some varieties have done better than others this year. Pears are fair to good. Plums and damsons are variable. The insect pests that did most harm were gooseberry saw-fly and magpie moth. Scab and canker on apples are to be seen in some orchards but are not general. Markets are local for most fruit. Black currants are usually sent to Richhill for jam-making. Gooseberries brought locally from 2*d.* to 6*d.* per quart, and strawberries from 6*d.* to 1*s.* 6*d.* per lb.; raspberries yet to be picked have been sold at 5*d.* per lb.; red and white currants are fetching 3*d.* per lb., and black currants 3*d.* to 4*d.* per lb.

REPORT ON THE PREVALENCE OF POTATO BLIGHT IN IRELAND UP TO THE 17th JULY, 1915.

The first appearance of Potato Blight was reported this year from Valentia Island on the 29th of May. Last year the first outbreak was noticed at Clifden, Co. Galway, on the 30th of June. At Castletownbere, Co. Cork, blight appeared on the 1st of June, 1915, and on the 6th of June the disease was reported as appearing on the borders of W. Cork and Kerry. On the 11th of June an attack of the disease was reported as appearing at Droum W., Co. Kerry, and on the 15th June at Lissacaha, Schull, Co. Cork. The disease made its appearance at Rosscarberry, Co. Cork, and near Dingle on the 19th June, and at Oughterard, Co. Galway, on the 23rd June.

For each of the weeks ended 3rd July, 10th July, and 17th July, respectively, weekly reports were received as in former years from approximately 1,300 rural Constabulary Sub-districts throughout the country. The following comparative table shows the total number of sub-districts from which blight outbreaks were reported in the corresponding three weeks of the seasons 1912, 1913, 1914, and 1915 :—

1912.	1913.	1914.	1915
240 up to 29th June	43 up to 28th June	9 up to 4th July	15 up to 3rd July
572 up to 6th July	196 up to 5th July	31 up to 11th July	32 up to 10th July
930 up to 13th July	283 up to 12th July	117 up to 18th July	93 up to 17th July

Owing to the dryness of the season up to the 28th June, very few reports of blight attack were received previous to that date. At mid-July the crop was reported as very healthy, although in some parts backward. Outbreaks of blight up to the present are chiefly confined to the early varieties.

ACTION OF THE DEPARTMENT.

I.—*General.*

The action which has been taken by the Department this season to secure the more general practice of spraying may be stated briefly as follows :—

Over 200,000 copies of the Department's leaflet No. 14, dealing with the prevention of potato blight and giving full directions with regard to the spraying of potatoes, have been printed and

distributed through the National Schools and numerous other sources to farmers in every district in Ireland.

Placards reminding farmers of the necessity for early spraying, and advising them to buy the raw material and prepare their own mixtures, have been displayed in every district in Ireland, and have also been sent to National Schools and to Creameries.

The County Instructors in Agriculture and Horticulture, of whom over 80 are now employed, have given special attention to the encouragement of spraying.

II.—*Congested Districts.*

Fifty-nine overseers and assistants, and nine temporary demonstrators in spraying are employed by the Department in congested districts, and, as forming part of their duties, these officers are required :—

(*a*) To repair spraying machines which are out of order.

(*b*) To sell spraying machines, where such cannot be obtained locally, to farmers within certain limits of valuation; and,

(*c*) Generally, to give demonstrations in spraying, as well as such instructions and advice as may be required by persons in their district.

The demand for spraying machines in congested areas has been great, and approximately 2,000 machines have been distributed this season.

III.—*Potato Disease.*

The Department are continuing the investigations relating to potato disease which have been in progress for several years at the temporary station at Clifden, Co. Galway.

A report on last year's investigations appeared in the issue of the Department's JOURNAL for April, 1915, Vol. XV., No. 8. This report has been reprinted and a copy may be obtained free of charge on application.

Farmers are specially invited to co-operate by sending particulars of the occurrence of any of these diseases in their districts. Specimens of diseased plants for examination and report can be sent free by letter post when addressed to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Such specimens should consist of the whole plant, including tubers, and should preferably be sent packed in a box.

THIRD IRISH EGG-LAYING COMPETITION.

THIRD QUARTERLY REPORT.

The following Table shows the position of the competing pens at the end of the third quarter.

Some Results. The position of the leading pens shows little change; it will be noticed, however, that Pen 22 gives place to Pen 25. This is owing to the broodiness, in June, of pullet No. 129. It will also be noted that the birds in Pen 16 have further improved their position. Some pens, notably Nos. 21, 23, 16, 4 and 20, have lost the positions they would otherwise have held owing to the fact that some of the pullets in these pens have never laid a first-grade egg.

Health. The health of the birds continues satisfactory. None of the first seven pens have lost a bird.

Order of Merit.	No. of Pen.	Breed.	No. of Eggs Laid 1st Oct.–30th June.	Value of Eggs Laid 1st Oct.–30th June. £ s. d.
1	25	White Wyandotte	949	5 18 7½
2	22	White Wyandotte	990	5 18 0
3	21	White Wyandotte	922	5 13 0
4	13	Buff Orpington	893	5 10 0
5	23	White Wyandotte	915	5 8 11½
6	15	White Wyandotte	870	5 6 5½
7	16	White Wyandotte	913	4 16 6½
8	5	White Leghorn	795	4 16 1
9	4	White Leghorn	857	4 14 8½
10	19	White Wyandotte	838	4 12 6
11	31	Rhode Island Red	823	4 11 8
12	24	White Wyandotte	752	4 11 7½
13	10	Red Sussex	808	4 11 6½
14	28	Rhode Island Red	765	4 11 4
15	1	Black Minorca	752	4 10 5½
16	20	White Wyandotte	824	4 9 0
17	27	White Wyandotte	763	4 8 9½
18	33	Rhode Island Red	695	4 5 1½
19	11	Buff Orpington	697	4 4 10½
20	18	White Wyandotte	729	4 2 9½
21	34	Rhode Island Red	700	4 2 6
22	14	Buff Orpington	689	4 0 10½
23	6	White Leghorn	675	3 19 6
24	36	Rhode Island Red	663	3 19 2½
25	32	Rhode Island Red	666	3 18 5½
26	2	Black Minorca	647	3 18 1
27	8	Brown Leghorn	681	3 15 7½
28	30	Rhode Island Red	643	3 14 1½
29	29	Rhode Island Red	660	3 12 1
30	12	Buff Orpington	601	3 11 2
31	9	Brown Leghorn	657	3 8 9½
32	17	White Wyandotte	575	3 5 1
33	35	Rhode Island Red	478	2 19 7

NON-COMPETING PENS.

First Year.

Order of Merit.	No. of Pen.	Breed.	No. of Eggs Laid 1st Oct.–30th June.	Value of Eggs Laid 1st Oct.–30th June. £ s. d.
1	26	White Wyandotte	927	5 18 4½
2	39	Rhode Island Red . . .	903	5 8 9
3	41	Rhode Island Red . . .	818	4 15 6½
4	43	Rhode Island Red . . .	833	4 14 8
5	38	Rhode Island Red . . .	815	4 11 7½
6	40	Rhode Island Red . . .	779	4 10 11
7	44	White Wyandotte . . .	790	4 10 9
8	37	Rhode Island Red . . .	738	4 5 11½
9	3	Black Minorca	621	3 13 6½
10	42	Rhode Island Red . . .	658	3 12 11½
11	7	White Leghorn . . .	571	3 5 0½

Second Year.

1	47	Rhode Island Red . . .	620	3 8 7
2	50	Rhode Island Red . . .	596	3 6 7
3	45	Rhode Island Red . . .	554	3 5 9
4	46	Rhode Island Red . . .	329	1 14 10½

Third Year.

1	49	Rhode Island Red . . .	406	2 6 9
2	48	Rhode Island Red . . .	229	1 5 4

L. MURPHY.

THE USE AND PURCHASE OF FEEDING STUFFS.

When purchasing feeding stuffs it is important not only that the farmer should obtain the best value for his money, but that the food purchased should suit the class of stock for which it is intended.

The value of any food, whether purchased or home-grown, depends mainly on the following considerations :—

(1) Composition.
(2) Digestibility.
(3) Manurial value.
(4) Value in comparison with other foods.

Composition.

In feeding stuffs there are many different constituents. Some of these resemble each other very closely not only in composition, but in the functions they perform in the animal body, so that it is possible to arrange them in different groups. Of these groups the following are the most important :—

Albuminoids or proteids.
Carbohydrates (starch, sugar, fibre, etc.).
Oils and fats.

Albuminoids comprise a large number of bodies which differ slightly from each other, but all agree in containing about 16 per cent. of nitrogen. They are essential in foods, being the only bodies supplying nitrogen for the repair of waste tissue, and for the formation of lean meat or muscle; for this reason they are sometimes called flesh-formers. They also play an important part in the production of milk, as well as in the production of meat.

Carbohydrates (starch, sugar, fibre, etc.).—These supply the animal with the power of doing work, and maintain the heat of the body. When consumed in excess of what is required for these purposes, the surplus is conducive to the formation of fat, which is stored up in the body as reserve material.

Oils and Fats.—These substances perform functions similar to those of the carbohydrates; the main difference between them lies in the fact that one part of fat is equal to nearly 2¼ parts of carbohydrate for the production of heat.

It will be noticed that the fats and carbohydrates are capable of replacing each other to a certain extent, but that neither can

take the place of the albuminoids in the formation of muscle and other nitrogenous bodies.

Other constituents of lesser importance in foods are:—

Amides.
Mineral matter or ash.
Water.

Amides are a class of bodies the functions of which are not very well understood. Like the albuminoids, to which they are closely related, they contain about 16 per cent. of nitrogen, but they cannot fulfil the same function in the animal body. They are of use in the animal system for the production of heat, but for this purpose they have a value of only a little over one-half that of carbohydrates. They are chiefly found in rank young grass and roots, and may possibly cause scour when present in any considerable quantity. They are found only to a very limited extent in concentrated cakes and meals, and are unimportant from a practical point of view.

Mineral Matter or Ash.—This is the ash left when a food is burnt. It is largely concerned in the formation of bone. Nearly every food contains sufficient mineral matter for the requirements of the animal. It is not taken into account when making up rations, nor when valuing a food except for its manurial value.

Water.—All foods contain more or less water. Even the driest cake has about 7 per cent. of moisture, while white turnips may contain as much as 92 per cent. From the chemical point of view this water in plants has no more feeding value than ordinary water which is taken in the usual way. From other points of view, however, the water in succulent foods, such as grass and roots, has more value than the same food when dried and fed along with water.

Digestibility.

If the chemical composition of foods were the only thing to be taken into account it would be a comparatively easy matter to arrive at their approximate values. The question is, however, much complicated by the fact that it is only the part of the food absorbed by the animal after digestion that really counts. Numerous experiments have been carried out (mostly on the Continent) with the object of determining the digestibility of the different food-constituents. The figures thus arrived at can only be regarded as averages, and must not be taken as absolutely correct for any particular food. This is more especially the case with regard to hay and straw, which contain large proportions of fibre. Even the same food will vary in digestibility according to the class of animal to which it is fed. Cattle and sheep that "chew the cud" can digest hay and straw that contain a large quantity of fibre better than horses, which do not ruminate.

When grass is cut early in the season the hay is much more easily

digested than if the grass is allowed to stand till nearly ripe before cutting. Although more bulk, and even weight, may be obtained with late cutting, the total feeding value may be less.

Again, the combination of foods used will affect their digestibility. When a food in which the dry material is chiefly in the form of starch or sugar (such as potatoes or roots) is fed in excess along with hay or straw, the fodder is thereby rendered more indigestible. On the other hand, a food rich in albuminoids, such as decorticated cotton cake, if fed in conjunction with roots and straw, will tend to counteract this injurious effect. A small quantity of food with a high percentage of digestible albuminoids may therefore have a value over and above its own intrinsic value when fed under those conditions.

Manurial Value.

All the principal feeding stuffs contain more or less nitrogen, phosphoric acid, and potash, the three ingredients to which manures largely owe their value. Of these three ingredients nitrogen is the most expensive; it therefore follows that foods that contain a large quantity of nitrogen, in other words, foods rich in albuminoids, have a high manurial value. For the relative manurial values of the feeding stuffs commonly used, see table on page 774.

Value in Comparison with other Foods.

The price that should be paid for a feeding stuff at any particular time must depend to a large extent on the current prices of other food stuffs capable of being used in place of it. For example, the relative values of barley and maize for pig-feeding differ but very slightly. During 1911, maize was about 30*s.* per ton dearer in November than in June. If a farmer had home-grown barley and required meal for pig feeding, his barley would have been worth considerably more for this purpose in November than it was in June.

Food Units.

Attempts have been made to fix unit values for the different ingredients in feeding stuffs, as is done with artificial manures, but so far without success. The question is much more complicated than in the case of manures. Thus none of the ordinary feeding stuffs contains only one ingredient to render it possible to compare the value thereof with the same ingredient in any other food; the different constituents are made up of groups closely resembling each other, but differing slightly in their feeding value. Even the same food may vary in value according to the class of stock to which it is fed; moreover, independently of price, the farmer must purchase food that will suit the class of stock for which it is intended. For example, no matter how cheap decorticated cotton cake may be compared with linseed cake, it should not be fed to very young

stock. For these and other reasons the unit system has been superseded by the method of comparing feeding stuffs on a basis of "total food units." By this system the different ingredients are reduced to a common value, so that comparison is rendered easier.

It is estimated that the digestible albuminoids (including the manurial value of the residue) and oils are worth about $2\frac{1}{2}$ times the value of the digestible carbohydrates. Adopting this as a standard, all that has to be done in order to ascertain the total food units in a particular food stuff is to add together the percentages of oils and albuminoids, multiply by $2\frac{1}{2}$, and add the percentage of carbohydrates. For example, supposing a cake contains

10 per cent. digestible oil,
20 „ „ albuminoids,
40 „ „ carbohydrates.

The total food units in this case would be—

$$2\frac{1}{2}\ (10+20)+40=115.$$

To get the value of one food unit the price per ton is divided by the total food units. If the above cake cost, say, £10 1*s.* 3*d.* per ton, the value of one food unit would be $\frac{\text{£}10\ 1s.\ 3d.}{115}=1s.\ 9d.$

A figure thus obtained may be used to compare the value at any particular time of other foods of a similar nature that can be used for the same purpose. No system of valuing food should be employed for the purpose of comparing the values of foods of a totally different nature. Thus, hay, straw or roots cannot be satisfactorily compared in this respect with concentrated foods, nor can even two such foods as maize and decorticated cotton cake. But while open to this objection such a system is useful for the purpose of comparing concentrated foods closely resembling each other, such as two different brands of linseed cake, or foods that are used for the same purpose. If this system of comparing foods were understood by farmers and put into practice, it would at least soon reduce the sale of spurious calf meals and foods of a similar nature that are sold at prices out of all proportion to their real value.

The following example is taken to illustrate this point. A calf meal containing

4 per cent. oil,
20 „ albuminoids,
62 „ carbohydrates,

has been sold in Ireland at £28 per ton. The total food units are

$2\frac{1}{2}(4+20)+62=122$, or 4*s.* 7*d.* per unit. Compare this with a good linseed cake meal costing £11 per ton and containing

10	per cent.	oil,
28	,,	albuminoids,
33	,,	carbohydrates.

The total food units here are $2\frac{1}{2}(10+28)+33=128$, or 1*s.* 8½*d.* per unit. Compared with the linseed cake meal the calf meal would be worth about 10*s.* 6*d.* per cwt. instead of 28*s.* When purchasing feeding stuffs it is the total albuminoids and oils, not the digestible portion, that are given, so that when valuing foods on the system of total food units it will generally be necessary to make the comparison on the full analysis in each case.

The seller is at present under no obligation to state the percentages of carbohydrates in a food. The average percentage of this and the other ingredients in the principal feeding stuffs will be found in the table on page 774. A few notes may be usefully supplied here regarding the suitability for different kinds of stock of the principal feeding stuffs referred to in that table.

Foods.

Cakes.

With the exception of compound cakes, cakes are bye-products obtained in the process of extracting oil from different kinds of seeds. The principal seeds from which oils are extracted in this country are: linseed, cotton seed, and soya bean. The feeding values of the different cakes depend in a large measure on the quality and purity of the seed used, and the system adopted for extracting the oil. Where pressure only is applied, and the temperature is not too high, the resulting cakes will contain a higher percentage of oil than when the newer method of using chemical reagents is employed. Owing to the fact that the quality of cakes may vary with the purity of the seed used, and with the process of manufacture, coupled with the circumstance that they can be easily adulterated, cakes should always be purchased with a guarantee of purity and analysis. Cakes should be stored in a dry, cool place. If the surroundings are damp, they soon deteriorate, and if the cakes become mouldy they may actually be dangerous if fed to stock.

Linseed cake is the residue left after a considerable portion of the oil has been extracted from linseed or flax seed. The chief supplies are of Russian, Home or American origin. The quality of the different cakes, more especially as regards oil, is generally in the order named. A good cake should crumble down easily with pressure, and feel soft and oily to the touch. Linseed cake is specially suited for young stock, and for all animals that are down in condition, while it is highly valued for giving a good finish and fine touch

to fattening cattle. Owing to its laxative nature it is useful in counteracting the effects of other foods that have an opposite tendency. For the same reason it is not a suitable food to be given in quantity to stock on young succulent pasture. It is sold in various forms—as cakes, nutted, and as meal. The best cakes are branded, but when bought in the nutted or ground form there is no means of tracing the identity of the brand. When meal is required for very young calves it is better, if there be any doubt about the matter, to purchase a well-known cake and get it ground, as there is more or less risk when meal is purchased as such, because of the fact that it may be made from a low class cake, deficient in oil, and containing ingredients which are unsuitable and dangerous for this class of stock.

Decorticated cotton cake is the residue of the cotton seed bean when the hard outer coating or "husk" is removed from the seed before grinding and extracting the oil. Even the best cakes contain a small portion of "husk." When the "husks" are removed in a careless manner the cake may contain a large quantity of it, and even a considerable quantity of cotton wool. A good cake should be soft in texture; it should be of a bright yellow colour, and it should contain very little cotton wool. The "husks" are sometimes ground to a fine powder and added to the cake. In this case their presence is more difficult to detect; but, if present in any considerable quantity, the cake will not possess the bright yellow colour so characteristic of the genuine fresh article. Owing to the high percentage of albuminoids it contains, decorticated cotton cake is of special value in improving a ration that is deficient in this constituent. When fed in conjunction with other concentrated foods it is one of the best foods for fattening cattle; and it is also suitable for dairy stock, as it improves the quality and texture of the butter. As a food, cotton cake has astringent or binding properties, and for this reason it is specially suited for feeding to stock on grass early in the season, or on aftermath when cattle are liable to suffer from scour. It should not be fed to young stock or in large quantities to cows that are within a few months of calving, otherwise delicate calves are likely to result. Valued on the food unit system it is usually one of the cheapest foods in the market.

Undecorticated cotton cake differs from decorticated cotton cake in not having the "husks" removed from the seed before grinding and extracting the oil. In purchasing this cake care should be taken to see that the "husks" which it contains are not too rough or coarse, and that the cake does not contain an excessive quantity of it or of cotton wool. The "husks" contain a large quantity of fibre, and have most astringent properties. As a rule cake made from Egyptian seed contains less fibre than that made from Bombay seed. Owing to its binding action it has to be used with extreme

caution, and is best suited for feeding stock over one year old on succulent grass, where it helps to prevent scour.

Soya cake is cake manufactured from the residue left after part of the oil is extracted from the soya bean. The soya bean contains about 18 per cent. of oil, and the ordinary cake made therefrom has about 6 per cent. oil, but where chemical reagents are employed in the extraction, the oil may not exceed 1 per cent. Soya cake contains about the same quantity of albuminoids as decorticated cotton cake, but does not possess the same astringent properties—indeed, the cake containing 6 per cent. oil, if fed in large quantities, is stated to have the opposite effect. It is a useful feeding stuff, and when given in suitable quantities in combination with other foods, it can be used for all kinds of stock—including dairy cows.

Cocoa nut and palm nut cakes and meals are the residue from the cocoa nut and palm nut respectively after part of the oil has been extracted. It occasionally happens that these cakes can be purchased at prices which compare favourably with those of the cakes already mentioned. When this is the case they can be substituted for part of the more expensive concentrated foods for nearly every class of stock on the farm. Both these cakes are specially suitable for dairy cows, and may be fed up to a maximum of 4 lb. per head per day. Palm nut meal should be fed in a dry state to cattle. Cocoa nut cake may be fed dry if cattle are also receiving roots, if not, the cake may be steeped in three or four times its weight of water 12 hours before feeding. When palm nut meal can be purchased at a reasonable price, it can be used with advantage as part of the feed for pigs; up to at least one-third of the total ration of fattening pigs may consist of this meal. Particular care should be taken to ensure that palm nut cake or meal is stored in a dry place, otherwise it may become rancid. For the same reason not more than three months supply should be purchased at one time.

Compound cakes.—Unlike the cakes already mentioned which are bye-products from one kind of seed, a circumstance that gives an indication of their nature, compound cakes are made by grinding and mixing together different kinds of grains, seeds, locust beans, etc. Even damaged grain which would otherwise be unsaleable, husks of oats from corn mills, and other equally worthless materials are sometimes ground up and mixed with a small quantity of molasses and spice to give them a relish and flavour, and then pressed into cakes. While there are, undoubtedly, good compound cakes in the market, there are also others of very doubtful quality, and, speaking generally, there is no question that the manufacture of such cakes offers careless individuals a means of disposing of inferior and damaged foods at a price out of all proportion to their value.

The value of compound cakes depends to a very large extent on the soundness and nature of the materials from which they are manufactured; this being so, the greatest care should be exercised when buying them, and on no account should such cakes be purchased unless from well-known firms that have a reputation at stake.

Beans. Beans are rich in albuminoids but deficient in oil. They are specially suited for cows in milk, and can be used to replace an equal quantity of decorticated cotton cake in the daily ration. For this purpose they should be finely ground, and, owing to their tendency to swell in the stomach, they should be well soaked before being used.

Peas. Peas resemble beans both as regards composition and feeding properties; and can be used for the same purpose and in a similar manner.

Brewer's and Distiller's Grains. Brewer's and distiller's grains are bye-products from breweries and distilleries respectively. When they can be purchased within carting distances wet grains can be used with considerable advantage for dairy cows. They encourage the flow of milk, but when fed in large quantities without a liberal allowance of concentrated foods in conjunction, they are apt to give the milk a poor, bluish colour, and may possibly tend to reduce the quality. Where grains are fed in the wet state, care should be taken to see that they are fresh, and that the troughs in which they are fed are kept thoroughly clean.

For use by those living at a distance from breweries or distilleries grains are artificially dried to keep them sweet and to save railway freight. Dried grains can be used as part of the ration for nearly every class of stock on the farm. They are specially valuable for milch cows and for ewes after lambing. Distiller's grains have a slightly higher value than brewer's, and generally command a higher price.

Malt Coombs. Malt coombs are dried sprouts which have been separated from malted barley. They are rich in albuminoids and contain a considerable portion of the nitrogen in the amide form. They can be used as part of the foods for most farm stock, and are specially suited for dairy cows. They require to be well soaked before using.

Bran. Bran is the outer coat or skin which is removed from wheat in the process of manufacture into flour. The colour of the bran depends on whether red or white wheat is used. Although white bran is generally sold at a much higher price than red bran, there is nothing in the analysis, and no evidence to show that it has a higher feeding

value. The fact that white bran commands a higher price has led to the practice of bleaching red bran white so as to command the higher price. The description "broad-leaved" bran simply means that the individual particles are of larger size than ordinary bran. There is no evidence to show that this broad-leaved bran is more valuable than the common bran, or that it is worth the extra money usually paid for it—except, perhaps, where it is used as a laxative. Bran can be used as part of the food mixture for nearly all kinds of stock, and it should always form part of the ration for milch cows in winter, especially if wet grains are not available. The food for sows, both before and immediately after farrowing, should also consist largely of bran. A small quantity mixed with oats for horses is also useful, especially for young colts. The finer portions of the milling offals are sold as pollard, sharps, thirds, middlings, etc. The latter contain a considerable portion of flour. They are used chiefly for pig feeding, for which purpose they are admirably adapted, more especially for young pigs, after they have begun to take "solid" food.

Cereal Grains.

The principal grains used in this country are wheat, oats, barley, and maize. As food stuffs these grains resemble each other in being specially rich in carbohydrates, chiefly in the form of starch.

Wheat of good quality as a rule is too expensive to use for feeding purposes. Wheat not suitable for milling and small grain can be ground into meal and used as part of the ration for dairy cows, fattening cattle, and young stock generally. There is no better way of using small wheat than by feeding it whole to poultry.

Barley is also as a rule too expensive for feeding. Secondary and even fairly good samples, if they do not command a price equal to maize, can be ground and used to replace maize meal especially for pig feeding.

Oats when crushed or ground can be fed to every animal on the farm. There is nothing to equal or replace oats as food for horses. When used with decorticated cotton cake or bean meal in equal quantities, or in the proportion of two of oats to one of cake or bean meal, they make a first class concentrated food for dairy cows. Along with linseed cake in the same proportions as above oats make an excellent food for weanling calves.

Maize is essentially a starchy food. Except for pig feeding it should be used in conjunction with foods rich in albuminoids. It is specially suited for fattening pigs, and may also form a considerable portion of the concentrated food for fattening cattle and for young stock. As part of a ration for milch cows it is excellent.

Maize Germ Meal. Maize germ meal is a bye-product in the manufacture of starch from maize. It can be used in much the same way as maize meal. It should only be used in moderate quantities to cows in milk or fattening pigs, as it is apt to impart a disagreeable flavour to the milk and pork.

Rice Meal. Rice meal is obtained from rice in its preparation for domestic purposes. When pure it is a useful article of diet and can often be purchased at a reasonable price. It is frequently adulterated with the ground husks of the rice, which are not only valueless, but actually injurious. Meals and cakes containing rice meal, if kept for any length of time, become filled with mites, and the percentage of oil soon diminishes. In fact, the food becomes unfit for the purpose for which it was sold.

Calf Meals. A calf meal should be easily digested, and if intended for very young calves it should contain a high percentage of oil. As the calf gets older, carbohydrates can gradually replace part of the oil. There is nothing to equal new milk for rearing calves, but except under special circumstances, where stock are likely to command enhanced prices, it is too expensive after the first few weeks.

For feeding along with separated milk the following mixture, which has been tested by the Department, and found to give good results, is recommended :—

1 part ground flax seed.
2 parts oat meal.
2 ,, maize meal.

A special warning is necessary regarding the use of inferior calf meals, which are so freely offered at exorbitant prices. Farmers should not be misled by the statement that costly ingredients are used in the manufacture of these meals, and that these ingredients possess a special value in preventing scour and keeping calves otherwise healthy. If calves are healthy there is no necessity to give them costly drugs; and if there is anything the matter with a calf it should get special treatment.

Further particulars regarding calf rearing and calf meals will be found in Leaflets Nos. 20 and 54.

Molasses or Treacle. Molasses is a bye-product in the manufacture of sugar. The principal ingredient in it is a carbohydrate in the form of sugar. Owing to its laxative nature, treacle, and more especially that derived from sugar beet, should be fed only in moderate quantities.

The best way to use molasses is to thin down with warm water, and mix with the daily ration. When cattle refuse to eat hay that

has become damaged during hay-making, the best way to induce them to do so is to sweeten it with treacle water.

Potatoes.

Potatoes are essentially a starchy food. Owing to their tendency to cause stomach troubles in cattle they should be fed with caution, and cattle should be gradually accustomed to their use. One of the best ways to dispose of refuse potatoes is to feed them to pigs or poultry. For this purpose they should be first boiled. The question as to whether marketable potatoes should be fed to pigs depends on the current price of maize and barley. One pound of either of these foods is practically equal to four pounds of potatoes for pig feeding. It is very questionable, therefore, if good potatoes should be fed to pigs if after deducting market expenses they can be sold at more than one-quarter the price of either barley or maize.

Hay and Oat Straw.

There is a great difference between the best and worst samples of hay, both as regards composition and digestibility, so that the actual analysis of any particular lot may either rise far above or fall far below the average. The quality will vary according to the soil, season, herbage on the meadow, time of cutting, and weather conditions during hay-making. The quality of oat straw will also depend on soil, season, variety, time of cutting, and weather during the harvest. Cattle eat the straw of some of the older varieties of oats, such as potato oats, much better than they do some of the new varieties, like Tartar King. Straw has a higher feeding value when cut before it is fully ripe. Hay, straw, and other bulky foods of a similar nature, cannot be valued or compared with concentrated foods on the basis of analysis. They supply the bulk which in the case of ruminants is necessary to keep the animals in a healthy condition.

Roots.

Mangels, swedes, yellow and white turnips, carrots and cabbages, all contain a large quantity of water, which may reach 92 per cent. in the case of white turnips. The principal solid constituent is sugar. A large proportion of the nitrogen is in the amide form. The composition of the roots varies according to soil, season, manurial treatment and size. The question as to whether the water in roots has a special feeding value has already been referred to. Mangels require to "mature" after storing, and should not, as a rule, be used till after the new year. Swedes and turnips impart a "turnipy" flavour to butter and should be used sparingly to cows when they are in milk, especially where butter is made and the cream or milk is not pasteurised before churning. Carrots are specially suited for horses, and cows in milk. Cabbages make first-rate feeding for cows in autumn or for fattening sheep or lambs.

Silage is the name given to fodder crops that have been preserved in the green state. In districts where, owing to climatic conditions, there is a difficulty in making first-class hay, the grass can be made into silage, which, if properly made, will have a higher feeding value than badly made hay.

Silage.

In some countries the custom of growing certain tillage crops such as maize, vetches, clover, oats, etc., for conversion into silage is on the increase. While good crops of maize can be grown in Ireland in favourable seasons, its general use cannot be recommended until its cultivation has received a more extended trial. On the other hand, crops such as a mixture of oats, peas and vetches can not only be grown successfully, but make much better silage than that obtained from either maize or grass.

Silage may be fed to all classes of farm stock, but is specially suited for milch cows in winter. In dairying districts where there is a difficulty in growing root crops owing to a scarcity of labour or other causes, this system of growing crops and converting them into silage for the production of winter milk is worthy of consideration.

Rations.

In making up food rations the following, amongst other points, should be taken into account:—

Rations.

(1) The kinds and quantities of home-grown produce available constitute the most important consideration. The quantity of roots that can be used is subject to more or less variation, and is capable of being either increased or diminished within certain limits by substituting concentrated foods. According to experiments carried out by the Department, 1 lb. of mixed cake and meal is practically equal to 1 stone of roots when fed to weanling calves or fattening cattle.

(2) The quantity of concentrated foods fed should depend on the object in view. Where roots are scarce it may be necessary to force stall-fed cattle so as to get the animals finished off as soon as possible; on the other hand, where there is a large quantity of roots to consume, and a prospect of an advance in the price of beef in spring, it might be more profitable to restrict the quantity of concentrated foods during the early stages of feeding. In the case of milch cows the quantity of concentrated foods should be regulated by the yield and the price realised for the milk. In feeding there is a point of "diminishing returns," i.e., a point where, when extra food is supplied, the increase in milk or weight, as the case may be, will not pay for the extra cost of the food. In the case of milch cows this point of "diminishing returns" will depend in large measure on the price realised for the milk. Where milk is sold at retail city prices it will pay to force its

production, but where it has to be made into butter, or sent to a creamery, the feeding will require to be on a more economical scale. If for an extra 3 lb. of meal, costing, say, 2*d.*, a cow gives an extra quart of milk, which is sold for 4*d.*, or even 3*d.*, a handsome profit is obtained ; but if the milk is sent to a creamery and the price realised is only 1½*d.*, such extra feeding would result in serious loss.

(3) The food should be of an appetising nature with an occasional change of diet. This is more especially the case where it is necessary to force for beef or milk.

(4) Where it is necessary to purchase feeding stuffs the materials selected should depend on the relative market prices of the different feeding stuffs suitable for the purpose intended.

(5) A mixture of concentrated foods generally gives a better result than any single cake or meal.

(6) Animals that have relatively large stomachs (cattle and sheep) require to be supplied with a sufficient quantity of bulky food.

(7) Foods that are inclined to impart a taste to milk should be avoided as far as possible.

(8) The concentrated food fed to each individual cow should vary with the yield of milk.

Up to a few years ago undue importance was attached to what is termed the albuminoid ratio (i.e., the relation between the digestible albuminoids on the one hand and the digestible oils and carbohydrates on the other); in fact, it was considered necessary to calculate this ratio to a decimal figure. Recent investigations have shown, however, that there is no necessity to go into the matter so closely as this. Where a general mixture of bulky and concentrated foods is used, the ratio is generally suitable for all practical purposes; in fact, very few (if any) of the most successful feeders ever calculate the ratio of the foods they use. Even if an exact ratio were desirable, it could not easily be calculated owing to the variability in the composition of the roots and fodder, and the differences in the digestibility of the latter.

Some Specimen Rations.

From the foregoing it will be readily understood that it is not possible to fix rations for each class of stock that would be generally applicable. A few, however, are given as a general guide. These are not to be regarded as suitable under every condition; the actual rations employed should be regulated according to the varied considerations already specified.

For winter feeding of dairy cows that calve from October till spring and are mainly dependent on house feeding, the following daily ration might be used :—

3 to 5 stones roots.
1¼ to 1½ stones hay or straw.
3 to 6 lbs. of a mixture of meal and cake.

The meal and cake mixture might be made up of :—

2 parts decorticated cotton cake.
2 „ crushed oats.
1 part bran.
1 „ dried grains.

Soya cake, cocoa nut cake, palm nut meal or bean meal could replace part of the decorticated cotton cake, and barley or maize meal the oats and dried grains.

Suggested daily ration for fattening cattle :—

4 to 6 stones roots.
1 to 1½ stones hay or straw or part of each.
4 to 8 lbs. mixture of cake and meal.

The meal and cake mixture in this instance might consist of :—

1 part linseed cake.
1 „ decorticated cotton cake.
2 parts oats, barley or maize meal.

The proportion of linseed cake could be increased during the finishing period. Commence with a daily allowance of from 3 to 4 lbs. and finish with from 7 to 9 lbs., according to the size of the cattle and the object in view.

Calves.—When calves are weaned from new milk the following daily ration is recommended :—

6 to 8 quarts separated, skim, or butter-milk.
½ lb. calf meal (see page 768).
½ lb. linseed cake.
Hay *ad lib.*

For weanling calves in winter :—

1 to 2 stones roots.
½ to ¾ stone hay.
1 to 2 lbs. cake and meal, containing
1 part linseed cake,
2 parts crushed oats, barley, or maize meal,

makes a suitable daily ration.

For store cattle that have a run out during the day oat straw may be substituted for hay; the quantity of roots might be increased and the linseed cake could be replaced by decorticated cotton cake, soya cake, cocoa nut cake or palm nut meal.

For fattening sheep the mixture of concentrated foods may consist of equal parts of oats, cracked maize, dried grains and decorticated cotton cake. Commence with ½ lb. and gradually increase to 1 lb., or in the case of the larger breeds 1½ lb., of the mixture per head per day during the finishing stage.

For ewes after lambing the following mixture may be used :—

2 parts oats.
1 part dried grains.
1 part bran.

Ewes with single lambs might be given 1 lb. and ewes with twin lambs up to 1½ lb. of the mixture per head per day.

A suitable ration for fattening pigs is :—

1 quart separated, skim, or butter-milk.
4 lb. potatoes.
1 to 2 lb. meal.

Given in quantities which they will readily clean up.

For fattening pigs there is nothing to equal milk. It is questionable if saleable potatoes should be fed if they can be sold at more than one-quarter the price of the meal used.

The meal may be either barley, maize, or pollard, or a mixture of these according to price.

It is suggested that if farmers have any doubt as to the suitability of the rations they are using for their live stock, or if they desire information regarding the purchase and use of any particular feeding stuff, they should consult the Instructor in Agriculture for their county, whose address is c/o The Secretary, County Committee of Agriculture.

[Table.

Table showing the total food ingredients, digestible portion, and manurial value of the principal feeding stuffs. Great variation occurs in the composition of any particular food, but the following data have been compiled from a number of sources and must be considered as having reference in each case to food of average quality.

Name of Feeding Stuff.	Total percentage in Foods.				Digestible percentage in Foods.			Estimated Manurial Value by consumption of one ton.
	Albuminoids, Amides, &c.	Oil.	Soluble Carbohydrates	Crude Fibre.	True Albuminoids.	Oil.	Carbohydrates and Fibre.	£ s. d.
Linseed Cake	30	10	34	9	25	9½	32	1 17 3
Decorticated Cotton Cake	41	9	26	8	34	8½	20	2 14 10
Undecorticated Cotton Cake	22	5½	34	20	15½	5¼	20	1 13 7
Soya Cake (Soy Bean Cake)	43	6	28	4	34	5½	22	2 13 6
Soya Meal (Soy Bean Meal) extracted	45	2	30	5	36	1¾	24	2 16 0
Cocoa-nut Cake	22	10	36	15	17	9½	39	1 11 10
Palm-nut Cake	17	10	36	22	14	9½	36	1 0 1
Beans	25	1½	48	7	19	1¼	48	1 11 11
Peas	23	1½	54	6	17	1	53	1 7 7
Brewer's Grains (wet)	5	1½	12	5	3½	1¼	10	0 5 11
Do. (dry)	19	5½	45	19	12½	5	38	1 2 5
Malt Coombs	23½	2	44	12½	11½	1½	39	1 14 11
Bran	14	4	56	9	10	3	45	1 6 6
Molasses or Treacle (Beet)	10	—	60	—	—	—	55	0 19 1
Do. (Cane)	2	—	66	—	—	—	60	0 19 1
Linseed or Flax Seed	23	36	23	6	17	34	21	1 9 2
Wheat	12	2	69	2	9	1¼	65	0 15 2
Barley	10	2	67	5	7	1¾	64	0 13 10
Oats	12	6	55	10	9	5¼	45	0 15 0
Maize or Indian Corn	10½	5	70	2	7	4½	68	0 13 2
Maize Germ Meal	14	8	57	5	10	7½	54	0 17 7
Rice Meal	12	12	50	8	6	10	42	0 19 10
Meadow Hay	10	2½	42	26	4	1	41	0 16 4
Clover Hay	13	2½	37	25	5½	1½	38	1 1 8
Pasture Grass	3	¾	10	5	1½	½	11	0 5 9
Oat Straw	3½	2	38	37	1	½	39	0 9 6
Potatoes	2	¼	21	1	1/10	1/10	19	0 4 6
Mangels	1¼	¼	9	1	1/10	1/10	9	0 3 5
Swedes	1¼	¼	8	1½	¼	1/10	8	0 2 8
Turnips	1	¼	6	1	¼	1/10	6	0 2 7
Carrots	1½	¼	9½	1½	½	1/10	10	0 2 7
Cabbage	2½	¾	7	2	1½	½	7	0 4 4

The above figures are abridged from the table prepared by Dr. Crowther and issued as a Bulletin, No. 73, by the University, Leeds.

Copies of this article in leaflet form (No. 2 Revised) may be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.

BREEDING AND FEEDING OF PIGS.

It is important that there should be the fullest co-operation between breeders, feeders and bacon curers if the pig industry is to be developed to the utmost extent in Ireland.

Type of Pig.

One of the chief factors upon which the success of the business depends is the type of pig which is raised and fattened, and it is in this direction that the need for co-operation amongst the interests concerned is greatest.

The Department are convinced that for the counties in Ulster and Co. Louth the Large White Ulster breed is the type of pig most suitable for the trade carried on there. In the other provinces no breed is so well suited for the general requirements of the industry as the Large York.

An animal of the Large York breed possessing the following points may be expected to give the greatest satisfaction :—

I. Neat Head. The pig that is very long in the head is usually narrow between the eyes, has seldom a very strong constitution, and has frequently rather more bone than is required. On the other hand, the pig that is very short in the head is usually too fat, too heavy in the fore end, thick in the neck, and heavy in the shoulders. Neat in the head means neither too long nor too short a nose. The ears should be fairly large, soft, and pliable and should fall a little to the front without actually being lopped.

II. Light neck and shoulder. The coarser parts of a side of bacon and those which fetch the lowest price are the neck and shoulder. The lighter these parts the better the side and the higher the price it will make.

III. Deep heart and well sprung ribs. Pigs are usually deficient in these points, which are, perhaps, the most valuable of those here enumerated. For stock purposes, breeders should, therefore, select only those animals which have these characteristics strongly developed.

IV. Thick loin. A pig with a good loin is almost invariably well ribbed, and has a strong constitution. From a breeder's and feeder's point of view, a good loin is most essential.

V. Stout thighs. This means a pig thoroughly well developed in the hams. The hams are the most important parts of the animal, and, in the case of pigs killed for the ham and middle trade, the most valuable of all, provided they are not too fat.

VI. Short legs. A pig that is long in the leg is nearly always flat in the ham and lacking in plumpness.

VII. Long and silky hair. Good hair is an indication of

strength of constitution as well as lean meat. The absence of hair generally proceeds from close breeding, and indicates a tendency to excessive fatness.

VIII. A long side of moderate depth, with thick flank.

To produce pigs having the qualities enumerated above, the first consideration must be the selection of the boar. It is said that the boar is half the herd. Even this estimate undervalues his power of reproducing his like. It is, therefore, all-important that the service of a boar possessing the particular points described should be obtained.

In selecting a sow there are a few points which a good specimen should possess in addition to those mentioned for the boar. The sow should be docile and should have at least twelve teats of equal size, and evenly placed well forward on the belly. Sows having large flat teats generally secrete very little milk, and on this account prove bad mothers. The fineness of the hair, skin, and bone all indicate a good quality of flesh, and an animal that is likely to become a good mother.

The pig that commands the highest price is an animal which, when well finished and not over fat, weighs 12 stone dead, or about 15½ to 16 stone living. A good pig should reach this weight at the age of from six to seven months.

Feeding.

Pigs should be well but not over fed; and it is only when fed regularly that the best results are obtainable.

During the sixteen weeks a sow goes in pig she should be allowed to run on grass and should receive a limited amount of other food. The chief points are to allow plenty of exercise and to reduce the cost of feeding within reasonable limits.

The free range on grass will keep the sow healthy and active, and her period of usefulness will be considerably extended. Moreover, she will produce stronger pigs and there will be fewer losses amongst the litters after farrowing.

The cost of feeding may be reduced by giving raw mangels, turnips, vetches, rape or other green food along with a small quantity of the cheapest meals or wet grains, if they are available.

It may be necessary to increase the allowance of grain or meal during the later stages of pregnancy, in order that the sow may be in good condition at the time of farrowing.

When the sow is rearing her litter, she should receive as much good food as she will take, consisting of potatoes, Indian meal, pollard, bran, and skim milk.

At three weeks old the young pigs begin to eat, and at this time should be supplied with skim milk, separated milk, or fresh buttermilk, which may be mixed with a little pollard, bran and boiled potatoes, and given twice or three times daily. For feeding the

young pigs there should be provided a special trough which should be thoroughly scalded with boiling water every few days. Care should be taken to prevent the young pigs having access to the sow's food. When eight weeks old the young pigs should be weaned. After weaning they should receive the same quality of food in a sloppy condition, and be allowed a little exercise. Throughout the fattening period three feeds a day should be given.

When the pigs have reached about 1 cwt. in live weight, the amount of exercise allowed them must be limited. The food at this period may consist of Indian meal or barley meal and pollard; potatoes, turnips, or mangels may be added if they are available. After the pigs have eaten as much as they appear to require, it is a good plan to add a small quantity of buttermilk, skim milk, separated milk or kitchen refuse to induce them to clean up all the food given them. The quantity of food which a pig should receive is just what it will eat up clean, no more and no less.

The addition of bruised oats or barley meal to the food of pigs which are being finished improves the whiteness of the fat and makes the flesh firmer. When the food contains a large proportion of brewery or distillery bye-products the fat produced is soft and of a yellowish colour, and the meat is not of good flavour. The excessive use of such foods is, therefore, to be avoided.

When palm nut or cocoa-nut meals can be purchased at prices which compare favourably with Indian meal they may, with advantage, be included in the rations for fattening pigs to the extent of one-third of the total quantity of food given.

The Use of Raw Meals.

Experiments made at the Department's Agricultural Stations, and by Agricultural Instructors in many counties in Ireland, have shown conclusively that the cooking of meal for pigs is not necessary. It is customary in this country to make the meal into porridge, either by boiling it or steeping it in boiling water. The labour and expense involved in the preparation of warm cooked food may be avoided, and equally as good results obtained from feeding raw meals which have been steeped in cold water. Pigs will eat the raw food as readily, and they will fatten as quicky as upon cooked food, while reports which the Department have received show that as good quality of bacon is produced in one case as in the other.

These statements refer only to the meals which are commonly used. As regards the feeding of potatoes, turnips and mangels in the raw state further experiments are in progress, and no definite statement can be made at present. It may be mentioned, however, that potatoes and roots can be fed in the raw state, but they should first be pulped as fine as possible.

Potatoes are not essential for the profitable production of pork.

Moreover, it is very doubtful if it is economical to feed potatoes if they can be sold at such rates that the net price is equal to one-fourth the cost of meal. For instance, if meal can be bought at 8*s*. per cwt. and potatoes can be sold at 2*s*. 6*d*. per cwt. it will pay better to sell the potatoes and purchase a corresponding amount of meal than to use the potatoes for feeding.

Breeding.

Every farmer should endeavour to breed the store pigs he requires; by so doing the following advantages are secured :—

I. Saving in cost.—Young pigs can usually be produced for less money than they cost if purchased.

II. Quicker returns.—Pigs reared on the farm fatten more readily than those bought in a fair or market.

III. Less risk of disease.—The risk of introducing swine fever is greatly reduced. This disease is never spontaneous in its origin, but arises from a specific germ conveyed from the body or excreta of a diseased pig.

IV. Steadier prices.—The periodical fluctuations in numbers which under existing conditions unsettle prices and disturb the industry would be less marked.

General Care and Housing.

It is important that the houses in which pigs are kept should be clean and dry. Every piggery should be cleaned out daily, and the pigs should always have a dry bed.

The Department receive numerous queries regarding the ailment known as "Cramps" in pigs. This condition occurs most frequently in young pigs which are weaned during the last three months of the year. One of the contributory causes is dampness, and particularly wet litter. There would be fewer complaints if dry litter were provided daily. Young pigs showing signs of lameness should be allowed to run out in a field for a short time on fine days, and a small quantity of fine coal or coal ashes should be provided every day.

The essential factors of successful pork-production may be summed up briefly as follows :—

(*a*) Good type of hardy, prolific and early-maturing pigs.
(*b*) Suitable foods.
(*c*) Regular feeding.
(*d*) Suitable houses.
(*e*) Due regard to cleanliness.

Copies of this article in leaflet form (No. 27 Revised) may be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.

ADVICE TO PIG FEEDERS.

The Report of the Departmental Committee on the Irish Pig Breeding Industry has now been issued, and should be studied by all who are interested in the breeding and feeding of pigs in Ireland. Copies of the Report are not supplied by the Department, but can be obtained either directly, or through any bookseller, from Messrs. E. Ponsonby, Ltd., 116 Grafton Street, Dublin, price 2½*d.* each, postage extra.

The Department consider that the following opinions expressed by the Committee cannot be too widely known:—

1. The prospects of the industry are good. The numbers of pigs in countries which export bacon to Great Britain are falling off, and it may be anticipated that, in consequence, exports of bacon will shrink, and that Irish bacon will be in great demand. The number of pigs in Ireland should, therefore, be increased.

2. It is not necessary to cook meals for pigs. Steep the meals in cold water and feed raw; just as good results will be obtained and labour and fuel will be saved.

3. About 5 cwt. Meal will produce 1 cwt. pork.
   Given in conjunction with other foods—
   About 4 lb. potatoes equal 1 lb. meal in feeding value.
   About 6 lb. separated milk equal 1 lb. meal in feeding value.
   Separated milk given with meal and potatoes is now worth 2*d.* per gallon.

4. Farmers should breed the pigs they fatten, and thus secure the profit of both breeder and feeder.

5. More home-grown foods should be produced for feeding to pigs. Barley, oats and potatoes are most suitable.

IMPORTANT.

The Department learn that in some cases farmers have used cod liver oil in the food for pigs. This is a most undesirable practice, as the oil imparts an objectionable, fishy flavour to the pork, which is not removed even by the process of curing.

Farmers, therefore, are most strongly urged not to feed cod liver oil to pigs under any circumstances. The use of this oil is not necessary; it injures the reputation of Irish bacon; it is unfair to bacon curers, and, above all, it re-acts against the farmers' own interests.

Copies of this article in leaflet form and of leaflet No. 27 may be obtained, free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.

OFFICIAL DOCUMENTS.

I.—AGRICULTURE.

FORM A. 133 (*a*).
1915.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

ROYAL COLLEGE OF SCIENCE, DUBLIN,

SESSION 1915–16.

SCHOLARSHIPS IN AGRICULTURE, HORTICULTURE, FORESTRY, AND CREAMERY MANAGEMENT.

A limited number of scholarships will be offered in 1915 for competition among young men in Ireland who desire to acquire a thorough knowledge of Technical Agriculture, and, in addition, one or more scholarships will be provided for students who intend to specialise in either Horticulture, Forestry, or Creamery Management. Each scholarship includes—(1) free admission to the first year's course of instruction in the College, (2) one third-class railway fare to Dublin at the beginning of the session, and one third-class fare from Dublin at the end of the session, and (3) either of the following at the option of the Department—(*a*) a maintenance allowance of one guinea per week while in attendance at the Royal College of Science or elsewhere as the Department may decide; or (*b*) free board and residence at one of the Department's institutions; in the latter case a small grant will be made to each student towards the cost of books and apparatus.

A scholarship is tenable for one year, but selected candidates must undergo a probationary course of one term of about three months. If satisfactory progress be made by the holder, the scholarship may be renewed for a second, a third, and a fourth year, to enable the student to complete his course.

The Department do not undertake to employ, or find employment for, students at the close of the period of training.

Holders of these scholarships will be subject to the regulations made from time to time at the Royal College of Science, and will be required to devote their whole time to the course of study prescribed for them by the Department.

Candidates, who should be between 18 and 30 years of age on the 1st September, 1915, must make application on a form, which may be obtained from the Secretary, Department

of Agriculture and Technical Instruction for Ireland, Dublin, or the Registrar, Royal College of Science for Ireland, Dublin, after the 1st February, 1915, and which should be returned not later than the 31st July, 1915.

Candidates must have been born in Ireland, or have been resident in Ireland for three years immediately prior to the 1st September, 1915.

Past and present students of the Royal College of Science for Ireland are ineligible as candidates.

The examination will take place in Dublin on the 11th, 12th, and 13th August, 1915. No expenses in connection with attendance at this examination will be allowed.

The subjects for the examination are:—

(1) English.
(2) *One* of the following: Latin, Irish, French, *or* German.
(3) Mathematics.
(4) Drawing.
(5) *One* of the following:—Agriculture, Horticulture, Forestry, *or* Dairying and Creamery Management.

Syllabuses of the Examination.

The examination in each language other than English will include passages to be translated into English from the books prescribed, together with questions in grammar and colloquial phrases, and a passage to be translated from English into the language selected. The books prescribed are:—

English.

1. English Composition.
2. Literature.

Shakespeare: Henry IV. First Part (School Edition). (Philological questions will not be asked.)

Milton: Lycidas.

Alexander Smith: Essays:—Dreamthorp, On the Writing of Essays, Christmas, On the Importance of a Man to Himself, On Books and Gardens (School Edition).

3. Outlines of History:
   Europe, with special reference to Ireland, Great Britain, and France, A.D. 1603 to A.D. 1760.

4. Geography:
   (*a*) Asia and Africa.
   (*b*) The British Empire in Asia and Africa, in more detail.

Latin.

Virgil: Æneid, Book II.

Cicero: An easy Selection from Cicero's Correspondence (Duff).

Irish.

O'Leary : Eisirt.
Craig : Iasgaireaċt Ṡéumuis Ḃig.

French.

Daudet : La belle Nivernaise (School Edition).
Ordonneau : Valabrègue et Kéroul, Les Boulinard.
Moffatt : French Science Course (University Tutorial Press).

German.

Gerstäcker : Herrn Mahlhubers Reiseabenteuer.
Schiller : Poems, viz.: Ritter Toggenburg, Der Ring des Polycrates, Die Kraniche des Ibycus, Die Bürgschaft, Der Graf Von Habsburg, Der Handschuh, Der Kampf mit dem Drachen.
Moffatt : German Science Course (University Tutorial Press).

Mathematics.

Arithmetic.—The first four rules, simple and compound; reduction, including metric system; unitary method in proportion; vulgar fractions; decimals; practice; simple and compound interest; square root; calculation of rectangular areas and rectangular volumes, percentages; profit and loss; averages and mixtures; the use of logarithms. (The use of algebraical symbols and methods is permitted.)

Algebra.—Addition, subtraction, multiplication, and division of algebraic integers; graphical representation of algebraic expressions and easy problems thereon; algebraic fractions; simple equations in one unknown quantity and problems thereon; simple equations involving two or more unknown quantities and the problems thereon; quadratic equations in a single unknown quantity and easy problems soluble by such equations; elementary theory of indices and logarithms.

Geometry.—An amount of geometrical knowledge approximately equivalent to that contained in Euclid, Books I., II., and III.—Deductions.

Trigonometry.—General definitions of the trigonometrical functions; elementary identities, determination of the numerical values of the trigonometrical functions of 30° and 45° and their multiples; solution of right-angled triangles; rule of sines; formula for the cosine of an angle of a triangle in terms of the sides, and easy questions on the solution of triangles dependent thereon; use of logarithmic and trigonometrical tables. Books of tables (to four places) will be supplied at the examination.

Drawing.

The Syllabus in Drawing will be the First and Second Years' Syllabuses of the Department's Programme for Day Secondary Schools.

One of the following :—

Agriculture.

Horticulture.

Forestry.

Dairying and Creamery Management.

Each applicant must have had substantial experience of practical work in connection with *either* farming, gardening, the management of woodlands, *or* dairying and creamery management. The examination may be written, oral, and practical. The subjects will include all the ordinary work of *either* farms, gardens, woods, *or* dairies as practised in Ireland. Under this head each applicant must present himself for examination only in the subject in which he desires a scholarship.

N.B.—On no account will a scholarship be awarded to a candidate who fails to attain a high standard in the subject he selects for this portion of the examination.

Marks will also be awarded on the ability of candidates to impart instruction as gauged by the style of the answers in both the written and the oral examinations.

Candidates who are qualified for scholarships by their examination on the foregoing subjects will be required to submit to an examination by a medical officer appointed by the Department. A scholarship will not be awarded in any case where the candidate is certified to be unfit to undertake the prescribed course of studies.

LAST DATE FOR RECEIVING APPLICATIONS,
31st JULY, 1915.

Form A. 180 (*a*).
1915.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

THE ALBERT AGRICULTURAL COLLEGE, GLASNEVIN, DUBLIN.

SESSION 1915-1916.

The Albert Agricultural College is situated on the north side of Dublin in a healthy situation about 170 ft. above the sea level. It is easily reached by tram to the Glasnevin terminus, from which it is distant less than a mile. The College consists of a residence for about sixty students, together with two farms, orchard, and gardens, all covering an area of about 400 acres.

The College provides courses of instruction—(*a*) for farmers, (*b*) for gardeners.

Two distinct courses of instruction for farmers are given—
(1) an agricultural course which occupies in the Department's scheme of agricultural education a position intermediate between the instruction given at the Agricultural Stations and that provided by the agricultural faculty of the Royal College of Science, Dublin ;
(2) a course for farm apprentices. This course which is mainly practical in character is designed to afford young men who intend to become farmers in Ireland an opportunity for obtaining a useful training in the management of live stock and the field operations usual on good tillage farms.

The Horticultural Course is intended for selected pupils who are seeking to improve their technical and practical knowledge of fruit and vegetable growing, or to qualify for the post of Instructor in Horticulture. (For particulars relative to the Horticultural Course see separate leaflet, A. 153*a*.)

AGRICULTURAL COURSES.

(1) The ordinary College course is intended for young men who desire a technical and practical knowledge of agriculture, to fit them for entrance to the Royal College of Science, Dublin, for becoming farmers, or for engaging in any other occupation—such as creamery management—which requires technical training in the sciences underlying agriculture. It includes instruction in agriculture in the classroom, farmyard, and fields, supplemented by lessons in dairying, horticulture, poultry manage-

ment, bee-keeping, and veterinary hygiene. The elements of physics, chemistry, botany, zoology, and entomology are taught so far as is necessary to the proper understanding of the principles underlying the most approved farmyard practice.

Instruction is also given in book-keeping, surveying, and wood-work, while literature, mathematics, and drawing receive such attention as is found requisite.

Encouragement is given to the pursuit of athletics and to the development of social intercourse among the students.

The College discussion society meets frequently throughout the session. The papers read before it relate to topics of current interest to the farming community.

The library is supplied with standard works on agriculture, and copies of the best farming periodicals are procured regularly for students' use.

The Staff.—The staff consists of Principal, Agriculturist, House Masters, and teachers of chemistry, botany, zoology, veterinary hygiene, horticulture, dairying, poultry-keeping, bee-keeping, and woodwork. A competent Drill Instructor attends weekly to see to the physical training of the students.

The Clergy of the different denominations also visit the College weekly to give religious instruction. The domestic comfort and bodily health of the students are under the care of an experienced Matron.

The Session.—The course of study extends over a session of ten months, which for the year 1915-16 will open on Tuesday, the 12th October, 1915, and end on Friday, the 11th August, 1916. There will be two intervals, each of about a fortnight—during which students will return to their homes—one at Christmas and the other at Easter.

College Certificate.—The College certificate is awarded partly on the result of the sessional examinations, and partly on the work done throughout the year. It is of two classes, the first being reserved for those students who add to an intelligent grasp of scientific principles a high standard of skill in practical farm work.

Conditions of Admission.—Admission to the College is conditional on passing the entrance examination, furnishing evidence of good health and character, and paying the required fee. Only resident students who are prepared to stay the whole session and to take the full curriculum are admitted. They must not be less than 17 or more than 30 years of age on 1st September, 1915.

The entrance examination will be held in the first week in September, 1915, at four centres situated one in each province. Each applicant for admission will be notified in due course as to the centre at which he will be required to present himself. No expenses will be allowed in respect of attendance.

The subjects included in the examination will be as follows :—

(1.) *English*, including dictation and composition.

(2.) *Arithmetic*, including calculations requiring a thorough knowledge of weights and measures, decimal and vulgar fractions, percentages, and interest.

(3.) *Mathematics*.—The elements of mensuration—lengths, areas, volumes; and algebra to simple equations.

(4.) *Agriculture*.—The questions on this subject are framed with a view to testing knowledge acquired by practical experience of farm work. No text-book is prescribed or recommended. The examination may be oral as well as written.

Fees.—The fees for tuition, board, residence, laundry, and ordinary medical attendance during the entire session are :—

For students whose parents or guardians derive their means of living mainly from farming in Ireland, £15

For students other than the foregoing, . . . £50

The fees are payable to the Principal in two instalments, viz., one of £10 (or £30) on entrance and the balance on 1st February. In addition to the instalment of the fee payable on entrance each student must deposit with the Principal a sum of £3 to cover the cost of repairs to clothing, and of books and stationery. The unexpended balance, if any, of this deposit will be returned at the close of the session.

Free Places.—Several County Committees of Agriculture make provision for scholarships tenable at the Albert Agricultural College. These scholarships are offered for competition amongst the best students attending the courses which are held each winter under the Department's scheme of Agricultural Classes.

Outfit.—Students are required to provide themselves with a proper outfit, particulars of which will be supplied to candidates successful at the entrance examination.

Application for Admission.—Application must be made on the prescribed form, to be obtained from—

THE DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET,
DUBLIN.

Applications will be dealt with in the order of their receipt in the Department's Offices. They should be forwarded not later than the 14th August, 1915.

Scholarships open to Past Students.—Several scholarships in agriculture tenable at the Royal College of Science, Dublin, are offered annually by the Department for competition among young Irish farmers. These scholarships are intended to enable students to become qualified for appointment to county

instructorships in agriculture, teacherships in agricultural schools, and other similar positions. Each scholarship includes free admission to the full four-years' course of training at the Royal College of Science, together with provision for the student's board and residence while in attendance at the College. The ordinary course at the Albert Agricultural College provides a suitable training for students who desire to compete for these scholarships.

(2) Course for Farm Apprentices.

A limited number of young men will be admitted as farm apprentices for a course of practical training on the College farms. Applicants must be at least 17 years of age on the 1st October, 1915, and must satisfy the Principal of the College as to their fitness for, and willingness to do and learn, farm work.

The period of training will be about twelve months. There will be an interval of one week during which the apprentices may return to their homes.

An apprentice who is found to be unable to perform a fair day's work or to be otherwise unsuitable will not be retained.

Apprentices will be admitted without payment of fee. They will be required to deposit with the Principal on entrance a sum of £1 to cover the cost of repairs to their clothing, and the purchase of such books, etc., as may be required by them. The balance, if any, of this deposit will be refunded at the termination of the course.

Apprentices must keep such hours as the work of the farm, including care of live stock, necessitates. They will be free on Saturday afternoons, except during seed-time, hay-time, harvest, or other periods of pressure.

Apprentices will reside in the buildings attached to the College and will be subject to the regulations applying to other students except that they will not be required to attend daily instruction in the class-rooms. Separate classes, in the evenings and at times when farm work is not pressing, will be formed for them.

Apprentices must provide themselves with a proper outfit, particulars of which will be supplied to selected applicants.

Applications for admission should be addressed to :—

The Secretary,
Department of Agriculture and
Technical Instruction for Ireland,
Upper Merrion Street,
Dublin.

A booklet descriptive of the College, and containing detailed syllabuses of the courses in the several subjects of the curriculum, may be obtained on application as above.

II.—TECHNICAL INSTRUCTION.

SUMMER COURSES OF INSTRUCTION FOR TEACHERS.

The fifteenth series of Summer Courses, organised by the Department of Agriculture and Technical Instruction for Ireland, for teachers in Technical, Secondary and National Schools, opened on the 6th July at various centres in Dublin and throughout the country, and will continue until the 30th July. The total number of teachers attending the Courses this year is 581.

PARTICULARS OF THE COURSES AND TEACHING STAFF.

The following courses are being held at the Royal College of Science:—

COURSE IN CHEMICAL MANUFACTURES.

This Course, intended primarily for teachers of Chemistry in Technical Schools, will include a treatment of typical examples of the principal metallurgical and manufacturing processes in use at the present time. The course is conducted by Mr. J. H. Pollok, D.SC., M.R.I.A. (Lecturer on Physical and Metallurgical Chemistry, R.C.SC.I.), assisted by Mr. W. D. Haigh, B.A., A.R.C.SC.I. (Demonstrator in Geology, R.C.SC.I.).

COURSE IN TESTING AND WORKING OF ELECTRICAL MACHINES.

This Course is for teachers and assistant teachers of Electrical Engineering in Technical Schools. The course is conducted under the general direction of Professor W. Brown, B.SC., M.I.E.E., by Mr. R. G. Allen, B.SC., A.R.C.SC.I., A.I.E.E. (Demonstrator in Electro-Technology, R.C.SC.I.), assisted by Mr. W. D. Douglas, A.R.C.SC.I. (Assistant Demonstrator in Physics, R.C.SC.I.).

COURSE IN TECHNOLOGY FOR TEACHERS OF INTRODUCTORY ENGLISH AND MATHEMATICS IN TECHNICAL SCHOOLS.

This course is attended by National School Teachers who give instruction as indicated in Technical Schools. The object of the Course is to indicate to such teachers the nature of the specialised instruction which will be subsequently taken up in succeeding sessions by their students, who are mainly of the Engineering and Building Trades types. Instruction will be given in Mechanical Drawing, Practical Geometry and Workshop Mathematics, and lectures will be given on the Technology of materials, on the source, manufacture, and general properties of selected materials, also on the steam engine and on some workshop practices. The course will be under the direction of Mr. G. E. Armstrong, M.SC. (Principal, Municipal Technical School, Londonderry), who will be assisted by Mr. O. S. Spokes, Science Teacher in the same institution.

Courses in Office Routine and Business Methods.

Instruction will be given in Business Methods and the keeping of accounts, in the methods of calculation used in commercial life, and in the routine methods and operations common in office work. The course is attended by teachers of elementary commercial subjects in Technical Schools, and will be conducted by Mr. E. Daly (Principal, Municipal Technical School, Drogheda), assisted by Mr. W. Scott (Instructor in Commerical Subjects, D.A.T.I.).

Course in Practical Mathematics and Mechanics.

This course is intended for teachers of Building Trades and Engineering subjects in Technical Schools, and for the further training of Manual Instructors who have attended the special courses conducted by the Department. The course is conducted by Mr. P. F. Gillies, B.SC. (Principal, Municipal Technical School, Ballymena), assisted by Mr. F. W. Warwick, B.A., B.E., A.R.C.SC.I. (Demonstrator in Engineering, R.C.SC.I.), and Mr. R. J. England, A.R.C.SC.I. (Assistant Demonstrator in Engineering, R.C.SC.I.).

Course in Manual Training (Metalwork).

This course is intended mainly for teachers of Manual Instruction in Day Trades Preparatory Schools. The course is registered by the City and Guilds of London Institute, but all teachers attending will be required to present themselves for the examinations which will be held at the close of the course. The course is conducted by Mr. J. G. Edwards, A.M.I.M.E. (Principal, Municipal Technical School, Portadown), assisted by Mr. A. Hutton (Municipal Technical School, Portadown).

Course in Wheelwrights' Work.

This course is intended mainly for teachers of Woodwork in rural distiicts. The course will include lectures on the nature and properties of timbers and metals employed in the construction of wheeled vehicles, and the forms and characteristics of the kinds of axles in general use and their suitability for various types of carts and vans. Lectures on the making of wheels will also be given, and instruction on painting, lining and varnishing provided. A considerable portion of the course will be in the drawing to scale of carts and their component parts. The course is conducted by Mr. J. E. Neild (Municipal Technical School, Manchester).

Courses in Hygiene and Sick Nursing.

Intended for Domestic Economy Instructresses and District Nurses who may desire to give instruction in the subject under local schemes of technical instruction. The purpose of the course is to afford further practical knowledge of the laws of health and of home nursing, so as to enable the students to introduce simple and well-directed instruction in these subjects into their teaching. The courses are under the direction of Mrs. Ella Webb, M.D. (of Dublin), and Miss Marion Andrews, M.D. (of Belfast), assisted by Mrs. Heppel-Marr (Dublin), Miss Chloe Bevis (Senior Sophister, T.C.D.), Miss M. J. M. Stewart, B.A., M.D., A.R.C.SC.I. (of Belfast), and Miss G. Murphy.

Courses in Experimental Science.

These courses are attended by Teachers in Secondary Schools, and instruction is given in Physics and Chemistry. The several courses are conducted by:—

Professor W. Brown, B.SC., M.I.E.E. (Professor of Applied Physics, R.C.SC.I.); Professor G. T. Morgan, D.SC., F.R.S., F.I.C. (Professor of Chemistry, R.C.SC.I.); Mr. F. E. W. Hackett, M.A., M.SC., PH.D. (Lecturer in Physics, R.C.SC.I.); Mr. T. A. W. Hill, B.SC. (Principal, Municipal Technical School, Blackrock, Co. Dublin); Mr. A. G. G. Leonard, B.SC., PH.D., A.R.C.SC.I. (Head Teacher, Chemistry Division, Crawford Municipal Technical Institute, Cork); Mr. A. O'Farrelly, M.A. (Lecturer on Organic Chemistry, R.C.SC.I.); and Mr. G. A. Watson, B.A., A.R.C.SC.I. (Science Master, High School, Dublin), assisted by Mr. W. D. Haigh, B.A., A.R.C.SC.I. (Demonstrator in Geology, R.C.SC.I.); Mr. G. W. Harris, B.A. (Science Teacher, Christian Brothers' Schools, North Richmond Street, Dublin); Mr. D. Hayes, M.A., B.SC., A.R.C.SC.I. (Science Teacher, Clongowes Wood College, Sallins); Mr. W. J. Lyons, B.A., A.R.C.SC. (Lond.) (Demonstrator in Physics, R.C.SC.I.); Mr. W. McLean, B.A., B.SC., A.R.C.SC.I. (Assistant Demonstrator in Agricultural Chemistry, R.C.SC.I.); Mr. R. V. Manning, A.R.C.SC.I. (Science Teacher, Royal Academical Institution, Belfast); Mr. H. Norminton, M.SC. (Science Teacher, St. Andrew's College, Dublin); Mr. Wm. O'Riordan, A.R.C.SC.I. (College Scholar, University College, Dublin); Mr. J. W. Porter (Associate Student, R.C.SC.I.); Mr. W. F. Woodworth (Associate Student, R.C.SC.I.).

Courses in Manual Training (Woodwork).

These courses are intended for Secondary School Teachers who will receive instruction in Drawing in addition to instruction in the use of Woodworking tools. The course is conducted by Mr. H. O. Armstrong (Principal, Municipal Technical School, Tralee), assisted by Mr. W. B. Jamison (Principal, Municipal Technical School, Carrickfergus).

The following courses are being conducted at the Metropolitan School of Art:—

Course in Furniture Design.

This course is intended for Teachers in Cabinet Making and Woodwork. The instruction will include general principles of furniture and interior woodwork and accessory fixtures; the influence of material and fundamental constructions; enrichment by carving, inlay, painting and metalwork. The study of historic examples as precedents to original design will form an important feature of the work. Drawings and designs will be made to scale and full size, for workshop requirements. Teachers attending this course may attend the ordinary school class in Woodcarving. The course is conducted by Mr. G. Atkinson, A.R.C.A., A.R.H.A. (Second Master, Metropolitan School of Art), assisted by Mr. J. S. Slator.

Course in Life Drawing and Figure Composition.

Intended for Art Teachers in Schools of Art and Technical Schools and for Advanced Art Students. Opportunities will also be given

if desired for study in the National Museum of Science and Art. The course will be conducted by the staff of the Metropolitan School of Art.

Course in Lithography.

For Art Teachers in Schools of Art and Technical Schools. The course will include lectures on the materials used, on the mixing of colours, etc., and practical work—drawing on stones, transferring, printing by means of hand press, etc. Course under the direction of Mr. F. Ernest Jackson (Teacher of Lithography at the Central School of Arts and Crafts, Southampton Row, London).

Course in Lettering and Illumination.

Intended for teachers in Schools of Art and Art Classes in Technical Schools, as a medium for instruction in Decorative Design. The instruction will follow the development and modifications of letter characters from the Roman originals with particular attention to the work of the Irish scribes. The use of lettering for ordinary conditions, such as posters and display work of all kinds, and for addresses, etc., will form part of the instruction. Course under the direction of Mr. C. Braithwaite, A.R.H.A. (Teacher of Lettering and Illumination at the Municipal Technical Institute, Belfast).

Course in Coloured Embroidery.

This course, also intended for Art Teachers in Schools of Art and Technical Schools, will include instruction in the requisites for Embroidery, materials and objects suitable for embroidery upon, and the different stitches used in embroidery. The course is conducted by Miss G. E. Atkinson, A.R.C.A. (Teacher of Embroidery at the Municipal Technical Institute, Belfast).

Course of Instruction for Teachers of Lacemaking, Crochet Work and Sprigging.

The object of the course is to improve existing kinds of work, and not to introduce new forms, and will include instruction in Carrickmacross Lace-making, Limerick Lace-making, Crochet Work (Clones and Raised), Crochet Point, and Sprigging. The lessons on each of these subjects will include practice in drawing and design and the preparation of working tracings, also instruction in technique and the use of suitable materials. The course is conducted under the general direction of Mr. G. Atkinson, A.R.C.A., A.R.H.A. (Second Master, Metropolitan School of Art), by Mr. G. A. Cogan (Art Teacher, Municipal Technical School, Kingstown), and Mrs. K. Breton (Teacher of Lace-making, Crawford Municipal School of Art, Cork), assisted by Miss A. McMenamin (Teacher of Sprigging, Co. Donegal Technical Instruction Committee).

Course in Drawing and Modelling.

Intended for Teachers in Secondary Schools who wish to become teachers of Drawing, but who are unable to obtain facilities during the school session, for instruction and practice under fully qualified teachers. This course is conducted by the staff of the Metropolitan School of Art.

Courses in Advanced Dressmaking and Advanced Cookery.

Intended for the further training of Domestic Economy Instructresses employed under local schemes of Technical Instruction. The courses will be conducted at the Irish Training School of Domestic Economy, Kilmacud, Stillorgan, Co. Dublin, under the direction of Miss R. Perkins (Teacher of Needlework and Dressmaking in the Training School), assisted by Miss Ellen Fitzgerald (Domestic Economy Instructress, Central Technical School, Tralee), and Mrs. McCarthy Judd (Teacher of Cookery in the Pembroke Technical Schools, Ringsend and Ballsbridge).

Courses in Rural Science (including School Gardening).

These courses will not begin until the 3rd August and will close on the 27th August. They are held for the purpose of training National School Teachers to give instruction in the Programme in Rural Science (including School Gardening) issued by the Commissioners of National Education. The instruction will be given partly in the Royal College of Science for Ireland, and partly in the School Gardens at the Albert Agricultural College, Glasnevin, and the Municipal School Garden, Eden Road, Kingstown. The teaching staff includes Professor G. A. J. Cole, F.G.S., M.R.I.A. (Professor of Geology, R.C.SC.I.); Mr. G. A. J. Clampett, F.R.C.A. (Municipal Technical Institute, Rathmines); Mr. D. Houston, F.L.S. (Lecturer on Agricultural Biology, R.C.SC.I.); Mr. L. J. Humphrey (School Gardening Organiser, D.A.T.I.); Mr. P. O'Connor (Demonstrator Botany Division, R.C.SC.I.); Mr. H. A. E. Cooper (Associate Student, R.C.SC.I.); Mr. E. Sheehy (Associate Student, R.C.SC.I.); Mr. J. Warnock (Marlborough Street Training College); and Mrs. M. C. Wright, A.R.C.SC.I.

The foregoing courses are all directly administered by the Department of Agriculture and Technical Instruction for Ireland. Other courses are conducted at Convent Centres for teachers, who are members of enclosed religious Orders, whilst the authorities of the Christian Brothers' have arranged for a course for members of that Order.

Courses will be held in Experimental Science and in Drawing and Modelling similar to the courses conducted by the Department, whilst instruction will also be given in Domestic Economy to enable teachers to secure recognition from the Department as teachers of Domestic Economy in Secondary Schools.

The following are the courses to be held at local centres:—

Ballyshannon: Convent of Mercy.—Course in Drawing and Modelling. Instructress: Miss D. Mackey (Art Teacher, Coleraine Municipal Technical School).

Belfast: St. Dominic's High School.—Courses in Elementary Physics and Chemistry. Instructor: Mr. J. Finlay, B.A. (Science Teacher, Mercantile College, Belfast).

Blackrock (Co. Dublin): Dominican Convent, Sion Hill.—Course in Domestic Economy. Instructress: Miss K. E. Warren (Domestic Economy Instructress, Municipal Technical School, Kingstown).

Cashel: Presentation Convent.—Course in Domestic Economy. Instructress: Miss F. L. Morris (Domestic Economy Instructress, Central Technical Institute, Waterford).

Cork: Christian Brothers' Schools, Our Lady's Mount.—Course in Elementary Physics. Instructors: Rev. Brother P. V. Ryan, A.R.C.SC.I., and Rev. Brother M. C. Wall.

Fermoy: Loretto Convent.—Course in Elementary Chemistry. Instructor: Mr. J. Enright, B.A., M.SC. (Science Teacher, City of Dublin Technical Schools).

Kiltimagh: St. Louis' Convent.—Course in Domestic Economy. Instructress: Miss M. Darling (Methodist College, Belfast).

Monaghan: St. Louis Convent.—Course in Drawing and Modelling. Instructor: Mr. P. L. Squire (Art Teacher, City Technical School, Kilkenny).

Newtownbarry: St. Mary's Convent.—Course in Elementary Physics. Instructor: Mr. Brice Moore, B.A., LL.B. (Principal, Academical Institution, Banbridge).

Rathfarnham: Loreto Abbey.—Course in Elementary Chemistry. Instructor: Mr. G. E. Ebrill, B.A. (Professor of Chemistry, Royal Veterinary College of Ireland). Course in Drawing and Modelling. Instructor: Mr. H. C. Charde (Art Teacher, Crawford Municipal School of Art, Cork).

Thurles: Presentation Convent.—Course in Elementary Physics. Instructor: Mr. C. G. Shankey, A.R.C.SC.I. (Science Teacher, Kilkenny College).

Waterford: Ursuline Convent.—Course in Elementary Physics. Instructor: Mr. B. O'Shaughnessy, A.R.C.SC. (Lond.) (Principal, Central Technical Institute, Waterford).

PROGRAMME OF EXPERIMENTAL SCIENCE, DRAWING, MANUAL INSTRUCTION, AND DOMESTIC ECONOMY FOR DAY SECONDARY SCHOOLS.

SESSION, 1915-16.

I.—EXPLANATORY CIRCULAR TO MANAGERS AND PRINCIPALS OF DAY SECONDARY SCHOOLS.

Department of Agriculture and
Technical Instruction for Ireland,
Upper Merrion Street, Dublin,
July, 1915.

Sir, or Madam,

The Regulations for the teaching of Experimental Science, Drawing, Manual Instruction, and Domestic Economy in Day Secondary Schools which were in operation during the academic year 1914-15 will continue in force during the year 1915-16.

Since the last publication of the Programme the following Syllabus of instruction has been revised:—

Special Course in Physiology and Hygiene (Form S. 285)—*July*, 1915.

The Syllabuses of the courses of instruction, as well as the Prefatory Note to the Syllabuses in Experimental Science, may be obtained separately for distribution among teachers.

A practice of permitting students, who are not of age to be eligible for grants under this Programme, to attend instruction in the First Year Syllabuses of the Preliminary Course has been observed in some schools. The Department will, as a rule, require that these students shall in future repeat the work of the First Year Syllabuses if claims in respect of their attendances at instruction in the subjects of the Programme are to be made in subsequent years. Should any such students, however, be presenting themselves for examination in the Junior Grade at the Intermediate Examinations in the year in which they will first become eligible for grants under the Programme, they will be permitted to proceed to the Second Year Syllabuses provided that the Inspector is satisfied that they have made such progress as would enable them to take, with advantage, the work of that year.

In regard to the cases of pupils who may, under Regulation III., 16, be working a second time through any Syllabus of the Programme, attention is directed to the fact that pupils who are capable of profiting by promotion to a higher course should not be permitted to repeat the previous year's course. The Department will withhold grants in respect of instruction given to pupils who may repeat the course of any year if, in the opinion of the Inspector, those pupils had made such progress as would enable them to take, with advantage, the work prescribed for the subsequent year, and in no case will pupils who were presented to the Department's Inspectors for the practical test for Honours Candidates, in connection with the examinations of the Intermediate Education Board for Ireland, be accepted for grants on account of a repetition of the same course.

The Department will require that Form S. 121, containing a list of all students following their Programme who have been registered as in attendance at instruction on or before the 1st November, shall be submitted by the 5th November. This form will be dealt with by the Department and returned to the Managers in order that they may furnish thereon the further information required by the Department in respect of students presenting themselves for "Experimental Science" at the examinations of the Intermediate Education Board.

The efficiency of instruction will, as hitherto, be tested by inspection, as a rule, without notice. Special Inspections of a more thorough character will, however, be held, of which due notice will be given to the School Managers. It is intended that such inspections shall not, as a rule, be held more frequently than once in three years for any one school. During the latter part of the school session notice will be given of a visit mainly for the purpose of holding the qualify-

ing practical tests for candidates for Honours in the subjects of the Programme at the Intermediate Examinations. This visit may, however, be dispensed with where there are no Honours Candidates to be presented. At any visit it will be within the discretion of the Inspector to test any or all of the classes by practical exercises in the laboratory; by the examination of note books, etc.; by *viva voce* examination of classes or of individuals; by written examinations; or by a combination of these methods.

It should be observed that the rates of payment may be increased by one-tenth or reduced by one or more tenths, as the Department, on consideration of the Inspector's report, may determine. Reduction by more tenths than one will be exceptional. In cases in which such exceptional treatment is necessary, the Department will consider the desirability of removing the School from the list of those aided by their grants.

The Department reserve the right to withdraw recognition of a teacher's qualifications should circumstances occur to render such a course desirable.

The details of the arrangements by which schools and pupils may obtain recognition under the regulations of the Intermediate Education Board for proficiency in Experimental Science, Drawing, and Domestic Economy, as well as the conditions required for a pass in these subjects, are published in the Rules of that Board.

I am,
Sir, or Madam,
Your obedient servant,
T. P. GILL,
Secretary.

II.—OFFICIAL CALENDAR, 1915-16.

1915.

August-September.—Application for the renewal of recognition of classes to be submitted at least a fortnight before their re-opening (Form S. 44 (*b*)).

Time-tables to be forwarded within fourteen days after the first meeting of the classes. (Flyleaf to Form S. 44.)

August 15th.—Latest date for applying for admission as a fee-paying student to the Royal College of Science, Dublin.

September 7th, 8th and 9th.—Examination for entrance to the Royal College of Science.

September 30th.—Latest date for submitting claims for attendance grants in respect of the Session 1914-15 (Form S. 62).

September 30th.—Latest date for submitting to the Department application for the renewal of recognition of classes for the Session 1915-16 (Form S. 44 (*b*)).

November 1st.—Pupils must have been registered as in attendance at each of the subjects of their course on or before this date. (See Regulations, Section IV., paragraph 20.)

November 5th.—Latest date for submitting lists of students attending the courses (Form S. 121).

1916.

January 31st.—Latest date for sending in statement of the number of pupils to be presented for the Intermediate Education Board's Examinations in "Experimental Science" (Form S. 127).

February 29th.—Latest date for forwarding applications for admission to the Special Examinations for Teachers' Qualifications in Experimental Science and Domestic Economy (see Form S. 108).

March 31st.—Latest date for applying for admission to the Summer Courses of Instruction for Teachers (see Form S. 41).

April 29th.—Special Examinations for Teachers' Qualifications in Experimental Science and Domestic Economy.

May 1st.—Managers of Day Secondary Schools, not on the list of schools recognised for grant by the Department, should apply by this date for the admission of their schools to this list if grants are to be claimed in respect of the Session 1916-17 (Form S. 44 (*a*)).

May 31st.—Latest date for forwarding applications for admission to the Examination for Science and Technological Scholarships and Teacherships in Training (see Form S. 33).

*June 12th.—Form S. 121 (*a*), showing the number of hours' instruction in the subjects of the Department's Programme received by students presenting "Experimental Science" for the Intermediate Education Board's Examinations, 1916, to be re-submitted to the Department by this date.

June 27th, 28th, 29th and 30th.—Examinations for Science and Technological Scholarships and Teacherships in Training.

July 4th.—Summer Courses for Teachers begin.

September 30th.—Latest date for submitting claims for attendance grants in respect of the Session 1915-16 (Form S. 62).

* This date is subject to alteration.

PROGRAMME FOR TECHNICAL SCHOOLS AND CLASSES.

SESSION 1915-16.

EXPLANATORY CIRCULAR.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN,
August, 1914.

SIR,

The Regulations for Technical Schools and Classes which were in operation during the Session 1914-15 will continue in force during the Session 1915-16.

Teachers attending the ordinary classes conducted in Technical Schools under the terms of Section II. (*a*) of this Programme will not be required to adopt courses of study as provided for in paragraph 18, and will be at liberty to attend instruction in any subject or subjects a knowledge of which would be of advantage to them in their work. Grants in such cases will not be paid, in any one year, for more than three subjects in respect of any one teacher, and the payment for any subject will be at the rate appropriate to the year of syllabus followed.

Attention is directed to the terms of Section II. (*a*) 9, under which it is necessary for the Managers of Schools to submit, by the 7th June in each year, full particulars of the courses of instruction to be adopted. The main subjects of each course should be indicated.

In order to facilitate the work of inspection, and the checking of the particulars as to previous training, etc., necessary in the case of all students in respect of whom it is proposed to claim grants under Sections II. (*a*) and III., the Department will require, by the 5th December in each year, a complete list of such students showing the courses of study followed by each and their qualifications for admission to the courses.

The Department have found that the conditions in regard to the keeping of admission registers have not been generally complied with, and they desire it to be understood that Managers of all Schools and Classes are expected to keep a systematic record of all students. A draft of an entrance form designed to meet the requirements of Section VII., 72, has been printed as Appendix C.

I am, Sir,
Your obedient Servant,
T. P. GILL,
Secretary.

Form S. 196.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

TRAINING OF TEACHERS OF CROCHET-WORK AND SPRIGGING.

SCHOLARSHIPS AT THE TRAINING SCHOOL FOR LACE AND SPRIGGING TEACHERS, ENNISKILLEN.

The Department will, in September, 1915, award not more than three Scholarships, tenable at the Training School for Lace and Sprigging Teachers, Enniskillen, to girls having a statisfactory general education, and some proficiency in Crochet-work or Sprigging.

These Scholarships are granted to enable the holders to secure training as teachers of Crocket-work or Sprigging.

The Scholarships will be of the value of £25 each, and will be tenable for one year. The Department reserve the right to determine a Scholarship at any time upon being satisfied that its continuance is for any reason undesirable.

Each candidate for a Scholarship will be required to submit to the Department, with the form of application, specimens of her work in either Crochet-work or Sprigging.

Should the work submitted be regarded as of a satisfactory standard, the candidate will be admitted to an examination which will consist of simple tests in English, Arithmetic, Drawing, and Crocket-work or Sprigging.

The Scholarship will be awarded as a result of the examination. Not more than one Scholarship will be awarded in the case of candidates from any one County.

The examination will be held at the Metropolitan School of Art, Kildare Street, Dublin, and at the Technical School, Enniskillen, on the following dates :—

Dublin : Crochet-work or Sprigging, on Tuesday, 7th September,
English, Arithmetic and Drawing, on Wednesday. 8th September.

Enniskillen : English, Arithmetic and Drawing, on Wednesday, 8th September.
Crochet-work or Sprigging, on Thursday, 9th September.

Candidates will be required to defray their own expenses in attending the examination.

Candidates must be at least 20 years of age on the 1st September, 1915, and must have been born in Ireland or have resided in the country for three years immediately preceding that date.

Two Certificates of good characte· will be required from all applicants, and selected candidates will be required to produce a medical certificate of health and an authenticated copy of certificate of birth.

The decision of the Department in regard to the selection of candidates or to any other question arising out of these Scholarships will be final.

Application must be made not later than the 20th August, on Form S. 197, copies of which may be had from the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Two specimens of finished work, and two specimens of work in progress must accompany such application.

Only those applications received at the Offices of the Department by Saturday, August 21st, 1915, will be taken into consideration.

Form S. 106.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
UPPER MERRION STREET, DUBLIN.

SPECIAL EXAMINATIONS IN BLACKBOARD DRAWING, 1915.

The Department will hold in October and November, 1915, Special Examinations in Blackboard Drawing for candidates for the Teachers' Certificates in Drawing and Art specified in Form S. 240. Only those candidates who have obtained all the other examination successes required for the Certificate they desire to secure will be admitted to the examinations.

Candidates for the Irish Secondary Teachers' Drawing Certificate who require a success in Blackboard Drawing to complete the requirements for this Certificate will also be admitted to the examinations.

Should a sufficient number of applications be received, arrangements will be made to hold these Examinations in Dublin, Belfast, Cork, Londonderry, Limerick, Waterford, and Galway. Examinations may, however, in special circumstances, be held at other centres, but applications for such Examinations must be submitted separately not later than the 1st September, and must be accompanied by a statement of the circumstances in each case.

Application for admission to the Examination must be submitted on Form S. 119, not later than the 16th September, 1915. Copies of this Form may be obtained from the offices of the Department.

The Department will not charge a fee for admission to the Examination, but the Managers of the Schools at which the Examinations will be conducted will be at liberty to charge each candidate a fee not exceeding 2*s.* 6*d.* for the accommodation provided.

III.—TRANSIT AND MARKETS.

(Eleventh List.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

BUTTER AND MARGARINE ACT, 1907.

(Sections 8 and 14 (1).)

LIST OF NAMES APPROVED BY THE DEPARTMENT FOR USE IN CONNECTION WITH MARGARINE.

NOTE.—Approval by the Department authorises the use of the name in Ireland only. Approval does not confer on any person any exclusive right to the use of the name, nor authorises its use by any person not entitled to use it.

Bonxie.
Egosin.
Kernal.
Kernello.
Kestrel.
Mimosa.
Nabu.
Oriole.
Petunia.
Red Hand.
Sotonia.
Viking Brand.

OFFICES, 4 UPPER MERRION STREET,
DUBLIN, 30*th June*, 1915.

IV.—VETERINARY.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

SLAUGHTER OF ANIMALS (IRELAND) ORDER OF 1915.

The Department of Agriculture and Technical Instruction for Ireland desire to direct the attention of persons owning, or concerned in the buying, selling, or slaughter of cattle or swine, to the above Order which has been made by the Department under the powers conferred on them by the Slaughter of Animals Act, 1914, for the purpose of maintaining a sufficient breeding stock.

The Order comes into operation on 24th June.

Its provisions make it illegal in Ireland to slaughter or for the owner to cause or permit to be slaughtered

(1) any animal which is visibly or obviously in-calf or in-pig; or

(2) any calf under the age of twelve weeks (male calves of the following dairy breeds excepted, viz., Channel Island, Ayrshire, and Kerry breeds).

Under the Slaughter of Animals Act, 1914, any person contravening this Order becomes liable, upon summary conviction, to a fine not exceeding twenty pounds; or if the offence is committed with respect to more than four animals to a fine not exceeding five pounds for each animal.

The Order does not apply to the slaughter of an animal necessary on account of accidental injury to the animal or its illness.

Similar Orders are being brought into force simultaneously in Great Britain.

Copies of the Order relating to Ireland may be obtained on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland (Veterinary Branch), Upper Mount Street, Dublin.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND.
22nd June, 1915.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

NOTICE TO EXPORTERS OF FAT SHEEP AND LAMBS.

The Department of Agriculture and Technical Instruction for Ireland desire to inform persons concerned in the exportation of Fat Sheep and Lambs ~~that,~~ under the Order of the Board of Agriculture and Fisheries for Great Britain, entitled the Sheep (Movement from Ireland) Order of 1908, Sheep or Lambs from Ireland intended for immediate slaughter can be admitted on special conditions to Markets, Fair Grounds, or Sale Yards, in Great Britain during any period when the entry of Sheep to such Markets, etc., is subject to local or general Regulations under one of the Sheep Dipping Orders now in force in Great Britain. Under these Orders such Market Regulations apply or may apply as follows :—

(1) In that part of England lying south of Lancashire and Yorkshire ; in the East Riding of Yorkshire ; and in that part of Wales lying south of Montgomeryshire (except north of Cardiganshire), from 15th July to 31st August.

(2) In the " Peak District " of Derbyshire and Yorkshire from 1st to 30th September.

(3) In the rest of England and in Scotland from 15th July to 15th November.

(4) In the rest of Wales (including North Cardiganshire) from 1st September to 15th November.

The effect of the Sheep (Movement from Ireland) Order is to allow the movement of Sheep or Lambs intended for immediate slaughter to be licensed from this country to the Market, Fair Ground, or Sale Yard concerned by an authorised Inspector or Officer of the Department after inspection of the Sheep ; but, before the Inspector can grant the Licence, the Exporter or his Agent must produce to him a Declaration on the Form (B) contained in the Sheep Dipping (Ireland) Order of 1915, showing that the animals have been dipped in accordance with the latter Order.

In the case, however, of Lambs not more than nine months old, the Licence may issue without production of any evidence as to Dipping, if the Inspector is satisfied that Dipping prior to movement is impracticable or inexpedient, and if the Local Authority of the district in which the Market, Fair Ground, or Sale Yard to which the Lambs are going is situate have given their consent, either generally or in the particular instance, to the Licence being issued on such modified conditions.

The persons to whom application should be made for the Licences referred to in this notice are the Veterinary Inspectors of the Department of Agriculture and Technical Instruction for Ireland, stationed at ports in Ireland. Forms for the purpose of the required Declaration may be obtained at any Police Barracks.

DEPARTMENT OF AGRICULTURE AND
TECHNICAL INSTRUCTION FOR IRELAND,
June, 1915.

NOTES AND MEMORANDA.

Meeting of the Agricultural Board.

A meeting of the Agricultural Board was held at the Offices of the Department, Upper Merrion Street, on Tuesday, 29th June, 1915. The following were present:—The Right Hon. T. W. Russell, P.C., M.P., Vice-President of the Department (in the Chair); Mr. John Bourke; Mr. Alexander L. Clark, J.P.; Alderman Henry Dale, J.P.; Mr. Robert Downes; Col. Sir Nugent T. Everard, Bart., H.M.L.; Sir Josslyn Gore-Booth, Bart., D.L.; Most Rev. Denis Kelly, D.D., Lord Bishop of Ross; Mr. John S. F. McCance, J.P.; Mr. George Murnaghan, J.P.; Mr. John D. O'Farrell; and Mr. Patrick J. O'Neill, J.P.

Very Rev. Charles Flynn, P.P., V.F., was unavoidably prevented from attending the meeting.

Mr. T. P. Gill, Secretary of the Department; Mr. J. R. Campbell, B.SC., Assistant Secretary in respect of Agriculture; Mr. George Fletcher, F.G.S., Assistant Secretary in respect of Technical Instruction; Mr. J. S. Gordon, B.SC., Deputy Assistant Secretary in respect of Agriculture and Chief Agricultural Inspector; Mr. H. G. Smith, LL.D., Chief Clerk; Mr. T. Butler, Superintendent of Statistics and Intelligence Branch: Mr. J. P. Walsh, Clerk in Charge of Accounts; Mr. J. V. Coyle, B.L. (who acted as Secretary to the Meeting); and Mr. F. J. Meyrick, M.A., were also present.

Mr. T. P. Gill was re-appointed to represent the Board on the Consultative Committee of Education for the triennial period 1915–1918.

The Board proceeded to consider the situation created by the effect of the war on the Department's finances, and concurred in the financial arrangements proposed for the year 1915–16. The County and other Schemes for the year, modified in accordance with the financial situation, were submitted and approved.

Meeting of Board of Technical Instruction.

A meeting of the Board of Technical Instruction was held on Wednesday, the 7th July, 1915, at the Offices of the Department, Upper Merrion Street, Dublin. The following were present:—The Right Hon. T. W. Russell, P.C., M.P., Vice-President of the Department (in the Chair); Mr. Frank Barbour; Rev. Henry Evans, D.D., M.R.I.A., F.I.H.; Mr. Francis McBride, J.P.; Mr. Patrick Mahon; Mr. William Macartney, J.P.; Mr. Seaghan T. O'Ceallaigh; Mr. Richard Sisk; and Mr. Alexander Taylor.

Mr. George Fletcher, F.G.S., Assistant Secretary in respect of

Technical Instruction; Mr. Thomas Butler, Superintendent of the Statistics and Intelligence Branch; Mr. W. Vickers Dixon, B.A., Senior Inspector of Technical Instruction; Mr. J. V. Coyle, B.L. (who acted as Secretary to the meeting); Mr. A. Kelly; and Mr. W. Bowers were also present.

Apologies for inability to attend the meeting were received from Very Rev. Canon Daly, D.D., P.P.; Mr. Christopher Dunn, J.P.; Rev. T. A. Finlay, M.A.; Mr. John A. M'Clelland, M.A., D.SC., F.R.S.; Alderman Samuel T. Mercier, J.P.; Alderman W. J. Moore, J.P.; Most Rev. Thomas O'Dea, D.D., Lord Bishop of Galway; the Right Worshipful Alderman Philip O'Donovan, Mayor of Limerick; Most Rev. Richard A. Sheehan, D.D., Lord Bishop of Waterford and Lismore.

Mr. John A. M'Clelland, M.A., D.SC., F.R.S., was re-elected to represent the Board on the Consultative Committee of Education for the triennial period, 1915-1918.

The Board had under consideration the division of the annual sum of £55,000 as provided by Section 16 (1) (*c*) of the Agriculture and Technical Instruction (Ireland), Act, 1899.

Technical instruction schemes in respect of the Session 1915-16 were considered and approved.

The Board had also under consideration the following matters:—Summer courses for teachers; provision for the maintenance of the Irish Training School of Domestic Economy, for the Killarney School of Housewifery, and for the Northlands School of Housewifery, Londonderry.

Meeting of Advisory Committee on Live Stock.

The Advisory Committee on the Breeding of Live Stock (exclusive of horses) met at the offices of the Department on Tuesday, 8th June, 1915. The following members were present:—Mr. J. R. Campbell, B.SC., Assistant Secretary in respect of Agriculture (in the chair); Mr. J. S. Gordon, B.SC., Deputy Assistant Secretary and Chief Agricultural Inspector; Messrs. R. A. Anderson; R. N. Boyd; James Byrne, J.P.; J. Cunningham; R. Downes, J.P.; Colonel Sir N. T. Everard, Bart., H.M.L.; Captain Lewis Riall, D.L.; and F. M. Shawe Taylor, J.P. Mr. D. Twomey, Inspector for Live Stock, and Mr. F. J. Meyrick, M.A., were in attendance.

The Committee had under consideration the working of the schemes for the improvement of the breeding of Cattle, Sheep, Pigs and Swine in the past year, and the amendments in the schemes for 1916 proposed by County Committees of Agriculture and the Department.

Food Production Committee.

The Vice-President of the Department of Agriculture and Technical Instruction for Ireland has appointed a Departmental Committee to consider and report what steps should be taken by legislation or otherwise for the sole purpose of maintaining and, if possible, increasing the present production of food in Ireland, on the assumption that the war may be prolonged beyond the harvest of 1916.

The Committee is constituted as follows :—

The Right Hon. T. W. Russell, P.C., M.P., Vice-President of the Department of Agriculture and Technical Instruction for Ireland (Chairman).
Mr. John Bagwell, General Manager, Great Northern Railway (Ireland).
Mr. Hugh T. Barrie, M.P.
Mr. C. F. Bastable, M.A., LL.D., Professor of Political Economy, Dublin University.
Mr. John Boland, M.P.
Mr. Robert N. Boyd, Co. Antrim.
Mr. J. R. Campbell, B.SC., Assistant Secretary in respect of Agriculture, Department of Agriculture and Technical Instruction for Ireland.
Mr. Robert Downes.
Mr. William Field, M.P.
Mr. Thomas P. Gill, Secretary, Department of Agriculture and Technical Instruction for Ireland.
Mr. James S. Gordon, B.SC., Deputy Assistant Secretary in respect of Agriculture and Chief Inspector, Department of Agriculture and Technical Instruction for Ireland.
The Most Rev. Dr. Kelly, Lord Bishop of Ross.
Mr. William M'Donald, J.P., ex-Chairman, Cork County Council.
Mr. Hugh de F. Montgomery, D.L., Fivemiletown, Tyrone.
Mr. George Murnaghan, J.P., Omagh, Tyrone.
Mr. Joseph O'Connor, Mylerstown, Naas, Kildare County Council.
Mr. Patrick J. O'Neill, J.P., Chairman Dublin County Council.
The Right Hon. Sir Horace C. Plunkett, D.C.L., K.C.V.O., etc., President Irish Agricultural Organisation Society.

Mr. E. A. M. Morris, M.A., Barrister-at-Law, has been appointed Secretary.

All communications on matters coming within the terms of reference should be addressed to the Secretary, Food Production Committee, 4 Upper Merrion Street, Dublin.

Crops and Live Stock. Owing to the exceptional circumstances and needs of the time and to provide information for the Departmental Committee on Food Production in Ireland, the Statistics and Intelligence Branch of the Department has issued the following specially early Preliminary Statements showing the numbers of Live Stock and the Acreage under certain Crops in Ireland on 1st June, 1914, and 1st June, 1915.

TABLE I.

Preliminary Table showing the Numbers of certain descriptions of Live Stock in Ireland on 1st June, 1914, and 1st June, 1915.

Description of Live Stock.	Numbers on 1st June.		Increase (+) or Decrease (—)	
	1914.	1915.	Number.	Percentage.
HORSES.				
Used for Agricultural Purposes	393,646	356,460	—37,186	— 9·4
UNBROKEN—				
One year old and upwards .	96,790	76,680	—20,110	—20·8
Under one year . . .	55,933	53,964	—1,969	— 3·5
CATTLE.				
Bulls	32,538	32,188	—350	— 1·1
Milch Cows	1,548,790	1,509,668	—39,122	— 2·5
Heifers-in-Calf . . .	90,139	83,359	—6,780	— 7·5
OTHER CATTLE—				
Two years old and upwards	1,099,645	961,861	—137,784	— 12·5
One year old and under two	1,141,461	1,065,016	— 76,445	— 6·7
Under one year . . .	1,139,072	1,192,293	+ 53,221	+ 4·7
TOTAL CATTLE . .	5,051,645	4,844,385	—207,260	— 4·1
SHEEP.				
BREEDING—				
Rams	45,970	45,941	—29	— 0·1
Ewes	1,408,262	1,431,316	+23,054	+ 1·6
OTHER SHEEP—				
One year old and upwards .	673,407	643,922	—29,485	— 4·4
Under one year . . .	1,472,942	1,478,340	+5,398	+ 0·4
TOTAL SHEEP . .	3,600,581	3,599,519	—1,062	0·0
PIGS.				
BREEDING—				
Boars	1,938	1,900	—38	— 2·0
Sows	133,188	122,020	—11,168	— 8·4
OTHER PIGS—				
Six months old and upwards	173,816	148,516	—25,300	—14·6
Under six months . .	996,696	932,599	—64,097	— 6·4
TOTAL PIGS	1,305,638	1,205,035	—100,603	— 7·7
POULTRY.				
TOTAL POULTRY . .	26,918,749	26,041,017	—877,732	— 3·3

TABLE II.

Preliminary Table showing the Acreage under certain Crops in Ireland on 1st June, 1914, and 1st June, 1915.

Crops.	Acreage on 1st June.		Increase (+) or Decrease (—)	
	1914.	1915.	Acreage.	Percentage.
Wheat	36,913	87,116	+50,203	+136·0
Oats	1,028,758	1,078,297	+49,539	+ 4·8
Barley	172,289	142,544	—29,745	— 17·3
Potatoes	583,069	594,801	+11,732	+ 2·0
Turnips	276,872	264,963	—11,909	— 4·3
Mangels	81,570	84,128	+ 2,558	+ 3·1
Flax	49,253	53,233	+ 3,980	+ 8·1
Hay :—				
First Year—	532,486	526,502	— 5,984	— 1·1
Second and Third Years	407,255	385,160	—22,095	— 5·4
Permanent Meadow	1,547,772	1,609,648	+61,876	+ 4·0

Statistics and Intelligence Branch,
7th July, 1915.

STATISTICAL

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned
compared with the

Kinds of Fish.	North Coast. *(Erris Head to Torr Head.)				East Coast. (Torr Head to Carnsore Point.)			
	1915.		1914.		1915		1914.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, ...	—	—	—	—	7	22	21	83
Soles, ...	1	5	3	14	15	81	41	245
Turbot, ...	—	—	3	8	4	20	20	101
Total Prime Fish, .	1	5	6	22	26	123	82	429
Cod, ...	42	27	98	54	1,488	1,552	2,303	2,194
Conger Eel, . . .	2	1	—	—	116	87	256	211
Haddock, ...	74	53	17	13	20	25	36	39
Hake, ...	—	—	—	—	255	432	177	240
Herrings, ...	73	30	—	—	502	133	21	7
Ling, ...	—	—	—	—	49	35	215	131
Mackerel, ...	112	19	336	75	—	—	—	—
Plaice, ...	234	263	417	384	339	516	457	598
Ray or Skate, . .	132	38	125	38	141	75	328	220
Sprats, ...	—	—	—	—	—	—	—	—
Whiting, ...	15	12	1	1	1,100	1,062	949	792
All other except Shell Fish	5	3	218	61	651	455	809	499
Total, . . .	690	451	1,218	648	4,687	4,495	5,633	5,360
SHELL FISH :—	No.		No.		No.		No.	
Crabs, . . .	1,865	12	3,048	19	564	5	1,850	13
Lobsters, . . .	1,016	28	2,910	91	2,204	85	2,770	143
	Cwt.		Cwt.		Cwt.		Cwt.	
Mussels, . . .	—	—	40	4	60	11	65	13
	No.		No.		No.		No.	
Oysters, . . .	—	—	—	—	2,898	4	8,883	11
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish, .	80	14	25	3	258	94	447	101
Total, . . .	—	54	—	117	—	199	—	281
Total value of Fish landed	—	505	—	765	—	4,694	—	5,641

NOTE.—The above figures are subject

* In monthly returns previous to and including December, 1914, the extent of each
Torr Head; East Coast—Torr Head to Carnsore Point; South Coast—

TABLES.

IRELAND.

as landed on the IRISH COASTS during the month of April, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1915		1914.		1915.		1914.		1915.		1914.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
9	19	34	64	1	5	—	—	17	46	55	147
50	270	173	801	10	41	35	120	76	397	252	1,180
6	30	12	46	6	24	12	60	16	74	47	215
65	319	219	911	17	70	47	180	109	517	354	1,542
17	23	108	79	40	21	127	54	1,587	1,623	2,636	2,381
2	1	27	12	—	—	39	15	120	89	322	238
2	2	63	38	19	36	74	56	115	116	190	146
—	—	21	13	—	—	—	—	255	432	198	253
6,561	1,315	264	134	18	12	—	—	7,154	1,490	285	141
96	77	47	45	58	40	44	34	203	152	306	210
19,345	7,556	27,537	8,695	733	224	106	59	20,190	7,799	27,979	8,829
120	163	191	168	29	32	77	72	722	974	1,142	1,222
137	44	151	22	25	7	14	3	435	164	618	283
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	85	39	1,115	1,074	1,035	832
124	78	227	71	347	100	124	92	1,127	636	1,378	723
26,469	9,578	28,855	10,188	1,286	542	737	604	33,132	15,066	36,443	16,800
No.		No.		No.		No.		No.		No.	
307	4	72	1	—	—	—	—	2,736	21	4,970	33
837	42	1,776	76	—	—	—	—	4,057	155	7,456	310
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
—	—	—	—	—	—	—	—	60	11	105	17
No.		No.		No.		No.		No.		No.	
—	—	7,392	14	—	—	—	—	2,898	4	16,275	25
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
280	37	468	76	423	193	282	75	1,041	338	1,222	255
—	83	—	167	—	193	—	75	—	529	—	640
—	9,661	—	10,355	—	735	—	679	—	15,595	—	17,440

to correction in Annual Returns.
of the Coasts referred to therein was as follows :—North Coast—Rossan Point to Carnsore Point to Kenmare ; West Coast—Kenmare to Rossan Point.

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. * (Erris Head to Torr Head.)				East Coast. (Torr Head to Carnsore Point.)			
	1915.		1914.		1915.		1914.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, ...	1	2	1	2	5	10	13	56
Soles, ...	18	70	7	33	12	68	60	264
Turbot, ...	11	39	6	16	2	10	22	124
Total Prime Fish, .	30	111	14	51	19	88	95	444
Cod, ...	8	7	171	89	313	534	893	903
Conger Eel, ...	1	1	—	—	130	110	304	236
Haddock, ...	75	68	36	19	9	14	36	48
Hake, ...	—	—	—	—	300	523	424	612
Herrings, ...	4,628	2,528	16,060	13,660	912	479	568	392
Ling, ...	—	—	2	1	43	38	281	193
Mackerel, ...	202	68	2,115	259	—	—	4	1
Plaice, ...	350	325	343	323	191	296	489	698
Ray or Skate, . .	612	157	71	24	283	212	340	188
Sprats, ...	—	—	—	—	—	—	—	—
Whiting	29	25	14	7	448	540	872	768
All other except Shell Fish	40	35	359	115	268	232	529	360
Total, . .	5,975	3,325	19,185	14,548	2,916	3,075	4,835	4,843
SHELL FISH :— . .	No.		No.		No.		No.	
Crabs, . . .	1,438	11	6,648	33	3,749	30	8,260	63
Lobsters. . .	1,942	60	4,806	151	3,037	112	4,970	238
	Cwt.		Cwt.		Cwt.		Cwt.	
Mussels, . .	—	—	—	—	126	22	153	8
	No.		No.		No.		No.	
Oysters, . .	—	—	—	—	—	—	—	—
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish, .	168	27	73	11	88	27	149	56
Total, . .	—	98	—	195	—	191	—	365
Total value of Fish landed	—	3,423	—	14,743	—	3,266	—	5,208

NOTE.—The above figures are subject

* In monthly returns previous to and including December, 1914, the extent of each Head; East Coast—Torr Head to Carnsore Point; South Coast—

IRELAND.

as landed on the IRISH COASTS during the month of May, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
7	14	11	21	—	—	—	—	13	26	25	79
39	184	45	212	12	40	37	112	81	362	149	621
3	11	8	31	14	43	12	56	30	103	48	227
49	209	64	264	26	83	49	168	124	491	.222	927
12	6	59	30	47	10	7	3	380	557	1,130	1,025
17	9	39	16	76	33	44	12	224	153	387	264
3	2	10	8	7	7	53	46	94	91	135	121
—	—	—	—	—	—	—	—	300	523	424	612
12,409	4,877	2,861	666	285	122	20	12	18,234	8,006	19,509	14,730
4	3	111	64	110	33	—	—	157	74	394	258
19,567	9,052	33,974	8,089	3,303	1,099	2,112	644	23,072	10,219	38,205	8,993
99	146	134	166	11	11	101	92	651	778	1,067	1,279
190	70	123	28	69	14	15	3	1,154	453	549	243
—	—	—	—	—	—	—	—	—	—	—	—
2	1	—	—	—	—	67	21	479	575	953	796
45	37	186	80	180	123	337	192	533	427	1,411	747
32,397	14,412	37,561	9,411	4,114	1,535	2,805	1,193	45,402	22,347	64,386	29,995
No.		No.		No.		No.		No.		No.	
456	5	2,053	20	—	—	—	—	5,643	46	16,961	116
4,504	198	8,924	390	3,685	105	7,248	270	13,168	475	25,948	1,049
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
—	—	—	—	—	—	—	—	126	22	153	8
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	—	—	—	—
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
176	21	236	25	368	66	479	94	800	141	937	186
—	224	—	435	—	171	—	364	—	684	—	1,359
—	14,636	—	9,846	—	1,706	—	1,557	—	23,031	—	31,354

to correction in Annual Returns.

of the Coasts referred to therein was as follows : North Coast—Rossan Point to Torr Carnsore Point to Kenmare ; West Coast—Kenmare to Rossan Point.

FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned
compared with the

Kinds of Fish.	North Coast. *(Erris Head to Torr Head).				East Coast. (Torr Head to Carnsore Point).			
	1915.		1914.		1915.		1914.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill,	19	22	9	22	1	3	9	39
Soles,	40	159	17	91	39	200	60	274
Turbot,	9	34	3	11	10	50	20	100
Total Prime Fish,	68	215	29	124	50	253	89	413
Cod,	3	3	22	13	216	344	748	839
Conger Eel,	1	1	—	—	120	103	290	242
Haddock,	—	—	45	24	61	77	88	106
Hake,	—	—	—	—	840	1,282	716	915
Herrings	2,396	2,077	5,589	4,513	13,822	8,900	15,306	4,472
Ling,	3	3	—	—	71	44	203	134
Mackerel,	1,298	295	466	72	270	43	1,233	135
Plaice,	380	367	422	383	228	393	355	435
Ray or Skate,	196	49	20	8	181	123	278	159
Sprats,	—	—	—	—	—	—	—	—
Whiting,	45	24	16	9	116	192	500	454
All other except Shell Fish	245	153	276	77	415	339	804	508
Total,	4,635	3,187	6,885	5,223	16,390	12,093	20,610	8,812
SHELL FISH :—	No.		No.		No.		No.	
Crabs,	15,559	59	10,608	42	10,625	68	25,066	62
Lobsters,	5,396	179	9,804	283	3,799	126	9,535	344
	Cwt.		Cwt.		Cwt.		Cwt.	
Mussels	40	4	—	—	—	—	—	—
	No.		No.		No.		No.	
Oysters,	—	—	—	—	—	—	—	—
	Cwt.		Cwt.		Cwt.		Cwt.	
Other Shell Fish,	34	5	75	12	177	65	175	56
Total,	—	247	—	337	—	259	—	462
Total value of Fish landed	—	3,434	—	5,560	—	12,352	—	9,274

NOTE.—The above figures are subject

*In monthly returns previous to and including December, 1914, the extent of each of the
Coast—Torr Head to Carnsore Point; South Coast—Carnsore

IRELAND.

as Landed on the Irish Coasts during the month of June, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head).				West Coast. (Loop Head to Erris Head).				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
6	11	6	11	—	—	—	—	26	36	24	72
45	193	31	153	20	95	34	93	144	647	142	611
2	8	5	20	13	44	12	49	34	136	40	180
53	212	42	184	33	139	46	142	204	819	206	863
21	20	90	57	51	10	38	15	291	377	898	924
79	42	134	37	82	32	66	22	282	178	490	301
—	—	20	17	8	7	5	3	69	84	158	150
6	5	—	—	—	—	—	—	846	1,287	716	915
11,278	9,293	1,940	831	566	244	510	235	28,062	20,514	23,345	10,051
32	38	175	96	130	35	25	16	236	120	403	246
12,560	6,982	20,890	6,373	4,650	1,681	4,049	1,101	18,778	9,001	26,638	7,681
84	116	124	173	27	27	100	90	719	903	1,001	1,081
132	55	72	16	102	19	54	13	611	246	424	196
—	—	—	—	—	—	—	—	—	—	—	—
6	5	12	7	—	—	56	19	167	221	584	489
130	68	316	160	268	136	420	213	1,058	696	1,816	958
24,381	16,836	23,815	7,951	5,917	2,330	5,369	1,869	51,323	34,446	56,679	23,855
No.		No.		No.		No.		No.		No.	
865	7	8,230	82	—	—	72	1	27,049	134	43,976	187
16,993	551	62,876	2,507	22,681	630	30,277	961	48,872	1,486	112,492	4,095
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
—	—	—	—	—	—	—	—	40	4	—	—
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	—	—	—	—
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
174	27	160	16	220	37	310	58	605	134	720	142
—	585	—	2,605	—	667	—	1,020	—	1,758	—	4,424
—	17,421	—	10,556	—	2,997	—	2,889	—	36,204	—	28,279

to correction in Annual Returns.
Coasts referred to therein was as follows :—North Coast—Rossan Point to Torr Head ; East Point to Kenmare ; West Coast—Kenmare to Rossan Point.

STATEMENT of the TOTAL QUANTITY of FISH landed on the ENGLISH and WELSH COASTS during the Month and Six Months ended 30th June, 1915, compared with the corresponding periods of the Year 1914.

KINDS OF FISH.	June.		Six months ended 30th June.	
	1915.	1914.	1915.	1914.
	QUANTITY.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill, ...	613	1,694	4,494	11,058
Soles, ...	2,441	5,459	15,489	36,992
Turbot, ...	1,865	6,814	13,159	39,249
Prime Fish not separately distinguished, . . .	—	334	—	543
Total Prime Fish, .	4,919	14,301	33,142	87,842
Bream, ...	854	7,593	15,956	34,352
Catfish, ...	9,135	17,583	26,163	54,613
Coalfish, ...	8,493	41,161	96,517	255,762
Cod, ...	135,941	354,754	945,867	1,771,638
Conger Eels, ...	5,790	4,322	28,254	31,503
Dabs, ...	6,893	7,208	41,132	57,216
Dogfish, ...	2,364	2,177	17,892	20,774
Dory, ...	42	401	324	1,137
Flounders or Flukes, . .	210	564	1,633	4,765
Gurnards, ...	4,841	9,993	26,832	56,389
Haddock, ...	123,497	146,823	569,868	631,032
Hake, ...	14,284	87,469	96,964	305,452
Halibut, ...	3,364	10,146	12,616	44,193
Latchets (Tubs), . . .	343	467	662	2,030
Lemon Soles, ...	2,287	6,216	10,500	25,008
Ling, ...	5,076	17,958	36,764	113,874
Megrims, ...	2,218	8,743	11,451	37,594
Monks (or Anglers), . .	1,542	3,020	10,280	17,813
Mullet (Red), ...	—	11	5	66
Plaice, ...	15,995	68,408	120,489	350,729
Pollack	391	1,015	10,488	8,689
Skates and Rays, . . .	22,042	33,841	112,918	194,185
Torsk, ...	1,697	4,027	5,779	11,901
Whiting, ...	11,963	28,748	96,644	239,319
Witches, ...	342	1,894	3,536	19,036
Herrings, ...	3,175	94,695	12,270	184,251
Mackerel, ...	19,462	44,655	210,890	212,890
Mullet (Grey)	16	49	635	336
Pilchards, ...	26	425	28	1,172
Sprats, ...	—	—	49,590	49,115
Whitebait, ...	600	669	2,430	2,508
Fish not separately distinguished, ...	12,256	32,856	84,834	223,941
Total Wet Fish, .	420,058	1,052,192	2,693,333	5,051,125
Shell Fish :—	No.	No.	No.	No.
Crabs, ...	785,224	628,009	3,012,255	3,571,666
Crawfish (Crayfish) . .	4,194	6,870	7,387	13,379
Lobsters, ...	67,459	85,295	214,248	348,257
Oysters, ...	439,000	1,118,850	13,797,010	12,650,127
	Cwt.	Cwt.	Cwt.	Cwt.
Other Shell Fish, . . .	26,940	34,413	235,389	286,270

NOTE.—The figures for 1915 are subject to revision.

Statement of the **Total Value** of **Fish** landed on the **English** and **Welsh Coasts** during the Month and Six Months ended 30th June, 1915, compared with the corresponding periods of the Year 1914.

Kinds of Fish.	June.		Six months ended 30th June.	
	1915.	1914.	1915.	1914.
	Value.			
	£	£	£	£
Brill,	2,559	5,205	19,098	36,042
Soles,	17,455	37,425	119,171	233,606
Turbot,	8,593	23,151	61,830	156,781
Prime Fish not separately distinguished,	—	541	—	883
Total Prime Fish,	28,607	66,322	200,099	427,312
Bream,	832	2,743	13,486	16,046
Catfish,	9,238	6,581	25,802	26,953
Coalfish,	7,281	8,922	61,241	73,237
Cod,	164,775	146,916	1,013,713	1,035,305
Conger Eels,	6,795	2,768	29,278	22,018
Dabs,	10,955	6,056	77,370	56,853
Dogfish,	1,347	676	9,888	6,859
Dory,	61	309	463	1,085
Flounders or Flukes,	290	413	1,734	3,305
Gurnards,	3,073	2,970	15,092	19,573
Haddock,	169,025	96,623	771,460	573,860
Hake,	28,862	80,554	178,197	325,447
Halibut,	13,253	29,252	54,338	145,731
Latchets (Tubs),	388	298	721	1,180
Lemon Soles,	8,925	14,059	40,802	72,535
Ling,	5,547	8,332	33,761	59,065
Megrims,	3,618	6,658	18,656	33,819
Monks (or Anglers),	1,577	1,571	9,038	11,577
Mullet (Red),	—	62	19	205
Plaice,	46,035	85,912	304,138	484,267
Pollack,	493	529	9,476	6,298
Skates and Rays,	24,531	24,314	121,463	151,799
Torsk,	1,003	1,387	3,680	5,294
Whiting,	18,517	14,817	125,442	169,708
Witches,	956	1,928	8,486	23,933
Herrings,	2,510	31,146	10,831	63,600
Mackerel,	18,376	23,815	140,030	112,166
Mullet (Grey),	44	116	929	712
Pilchards,	22	148	23	445
Sprats,	—	—	9,266	9,862
Whitebait	1,065	1,442	4,031	5,428
Fish not separately distinguished,	12,236	19,558	69,319	130,189
Total Wet Fish	590,242	687,197	3,362,272	4,075,666
Shell Fish:—				
Crabs,	9,289	9,435	32,060	39,227
Crawfish (Crayfish)	384	619	626	1,302
Lobsters,	3,128	4,088	10,290	17,993
Oysters,	475	1,423	42,375	38,983
Other Shell Fish,	10,764	9,673	54,782	61,302
Total Shell Fish,	24,040	25,238	140,133	158,807
Total Value	614,282	712,435	3,502,405	4,234,473

Note.—The figures for 1915 are subject to revision.

Statement of the **Total Quantity** of the **Fish** landed on the **Scottish Coasts** during the Month and Six Months ended 30th June, 1915, compared with the corresponding periods of the year 1914.

Kinds of Fish.	June.		Six Months ended 30th June.	
	1915.	1914.	1915.	1914.
	Quantity			
	Cwt.	Cwt.	Cwt.	Cwt.
Herrings	70,668	1,694,853	300,922	3,101,389
Sprats	—	—	2,344	4,741
Sparlings	1	—	142	117
Mackerel	7,161	5,500	8,618	18,4[illegible]5
Cod and Codling	33,373	70,783	264,385	451,562
Ling	8,437	23,817	56,757	112,0[illegible]3
Torsk (Tusk)	894	2,38[illegible]	6,575	9,841
Saith (Coal Fish)	8,266	28,776	83,534	160,910
Haddocks	48,285	40,452	240,915	258,2[illegible]1
Whitings	10,761	16,375	40,2[illegible]4	127,523
Conger Eels	718	537	8,244	19,[illegible]04
Gurnards	265	316	1,719	2,127
Catfish	3,026	5,224	15,577	19,49[illegible]
Monks (Anglers)	612	1,765	5,0[illegible]0	12,305
Hake	373	5,938	3,612	12,074
Squids	—	—	26	10
Turbot	76	318	1,2[illegible]9	2,106
Halibut	2,085	5,185	9,539	22,[illegible]18
Lemon Soles	1,933	3,766	11,263	14,001
Flounders	613	836	2,731	3,[illegible]65
Plaice	1,407	3,246	15,929	20,153
Brill	6	43	51	217
Dabs	660	762	3,451	4,245
Witches	52	1,704	1,325	10,803
Megrims	399	1,041	6,203	10,373
Skates and Rays	8,060	13,3[illegible]4	58,032	98,699
Unclassified kinds	172	333	1,301	5,149
Totals	208,303	1,927,318	1,149,818	4,601,913
	No.	No.	No.	No.
Shell Fish :—				
Crabs	235,719	133,590	81[illegible],921	1,071,650
Lobsters	60,823	39,174	232,486	255,086
Oysters	16,700	12,900	251,5[illegible]4	433,740
	Cwt.	Cwt.	Cwt.	Cwt.
Clams	765	25,595	6,705	28,367
Mussels	15,454	28,7[illegible]0	72,843	63,128
Unclassified	3,260	2,851	27,972	22,947

The above figures are subject to correction in the Annual Returns.

Statement of the **Total Value** of the **Fish** landed on the **Scottish Coasts** during the Month and Six Months ended 30th June, 1915, compared with the corresponding periods of the year 1914.

Kinds of Fish.	June.		Six Months ended 30th June.	
	1915.	1914.	1915.	1914.
	Value			
	£	£	£	£
Herrings	57,157	503,671	158,721	827,200
Sprats	—	—	864	509
Sparlings	2	—	346	393
Mackerel	2.355	901	2.872	5,048
Cod and Codling	35,242	33,283	249,019	255,021
Ling	6,047	8,618	39,003	42,840
Torsk (Tusk)	791	736	5,460	3,409
Saith (Coal Fish)	3,519	3,627	31,902	30,864
Haddocks	49,626	29,600	245,449	229,464
Whitings	8,530	6,732	35,888	77,685
Conger Eels	621	312	4,962	8,860
Gurnards	94	53	570	429
Catfish	1,806	1,105	8,760	5,799
Monks (Anglers)	310	337	2,507	3,632
Hake	348	3,180	6,186	9,571
Squids	—	—	12	1
Turbot	240	868	4,353	6,277
Halibut	6,305	11,436	30,405	53,998
Lemon Soles	6.987	7,450	42,330	37,089
Flounders	396	537	2.101	2,458
Plaice	3,157	5,428	30,261	34,892
Brill	14	75	122	362
Dabs	495	340	2,394	1,859
Witches	105	1,417	2,936	13,478
Megrims	1,137	1,393	15,684	14,204
Skates and Rays	4,536	3,136	28,699	29,962
Unclassified kinds	65	67	535	700
Totals	189,885	624,302	952,341	1,696,004
Shell Fish :—				
Crabs	2,018	933	6,849	9,038
Lobsters	2,746	1,904	11 961	15,566
Oysters	62	50	986	1,623
Clams	115	220	807	729
Mussels	797	1,728	3,854	3,589
Unclassified	1,142	1,239	5,261	7,108
Total Value	6.880	6,074	29,718	37,653
Total Value of all Fish	196,765	630,376	982,059	1,733.657

The above figures are subject to correction in the Annual Returns.

STATEMENT of the TOTAL QUANTITY and VALUE of the FISH returned as landed on the IRISH COASTS during the Month and Six Months ended 30th June, 1915, compared with the corresponding periods of the Year 1914.

Kinds of Fish.	June.		Six Months ended 30th June.	
	1915.	1914.	1915.	1914.
	QUANTITY.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill,	26	24	133	228
Soles,	144	142	606	875
Turbot,	34	40	157	267
Total Prime Fish,	204	206	896	1,370
Cod,	291	898	8,694	14,066
Conger Eel,	282	490	1,310	2,579
Haddock,	69	158	1,166	2,385
Hake,	846	716	1,567	2,204
Herrings,	28,062	23,345	90,543	146,955
Ling,	236	403	1,118	2,371
Mackerel,	18,776	26,638	67,654	125,662
Plaice,	719	1,001	3,849	5,143
Ray or Skate,	611	424	3,863	3,635
Sprats,	—	—	38	77
Whiting,	167	584	3,350	7,552
All other except Shell Fish,	1,058	1,816	4,865	6,810
Total,	51,323	56,679	188,613	320,809
Shell Fish:—	No.	No.	No.	No.
Crabs,	27,049	43,976	35,626	68,139
Lobsters,	48,872	112,492	28,686	153,493
	Cwt.	Cwt.	Cwt.	Cwt.
Mussels,	40	—	3,137	4,811
	No.	No.	No.	No.
Oysters,	—	—	78,492	147,309
	Cwt.	Cwt.	Cwt.	Cwt.
Other Shell Fish,	605	720	5,891	7,006
	VALUE.			
	£	£	£	£
Brill,	36	72	337	596
Soles,	647	611	3,021	3,881
Turbot,	136	180	680	1,261
Total Prime Fish,	819	863	4,038	5,738
Cod,	377	924	8,401	10,971
Conger Eel,	178	301	936	1,839
Haddock,	84	150	1,160	2,023
Hake,	1,287	915	2,500	2,825
Herrings,	20,514	10,051	45,604	48,890
Ling,	120	246	821	1,843
Mackerel,	9,001	7,681	29,931	34,731
Plaice,	903	1,081	5,389	5,918
Ray or Skate,	246	196	1,562	1,701
Sprats,	—	—	10	16
Whiting,	221	489	3,519	3,738
All other except Shell Fish,	696	958	3,191	3,738
Total,	34,446	23,855	107,062	123,971
Shell Fish:—				
Crabs,	134	187	202	344
Lobsters,	1,486	4,095	2,403	5,889
Mussels,	4	—	390	651
Oysters,	—	—	158	231
Other Shell Fish,	134	142	1,463	1,570
Total,	1,758	4,424	4,616	8,685
Total Value of Fish landed,	36,204	28,279	111,678	132,656

NOTE.—The above figures are subject to correction in Annual Returns.

EMIGRATION FROM IRELAND.

TABLE showing, by Destinations, the Numbers of Emigrants (Natives of Ireland) who left the Ports of Ireland during the Months of April, May, and June, 1915, and the total for the Six Months ended the 30th June, 1915, together with the total Number of Emigrants in each of the corresponding periods of the year, 1915.

DESTINATION.	April, 1915.	May, 1915.	June, 1915.	Six Months ended 30th June, 1915.
FOREIGN COUNTRIES AND THE COLONIES :—				
America (U.S.), .	524	805	871	2,489
Canada, . . .	93	61	58	343
South Africa, . .	8	2	5	32
Australia, . .	41	22	17	187
New Zealand, . .	5	3	—	25
Other Countries, .	4	1	2	8
Total, . . .	675	894	953	3,084
GREAT BRITAIN :—				
England and Wales, .	130	112	163	924
Scotland, . . .	19	19	7	53
Total, . . .	149	131	170	977
General Total, 1915,	824	1,025	1,123	4,061
General Total, 1914,	5,141	3,648	1,460	12,909

The figures in the above Table have been abstracted from the monthly Return published by the Registrar-General for Ireland.

The figures are subject to revision in the Annual Report.

Monthly and Quarterly Average Prices for Ireland of Crops, Live Stock, Meat, Provisions, &c., for the period ended 30th June, 1915.

Product.	Month. April.	Month. May.	Month. June.	Quarter. 1915.	Quarter. 1914.
Crops:	s. d.	s. d.	s. d.	s. d.	s. d.
Wheat, .. per 112 lbs.	—	—	—	—	—
Oats (White), „	10 5	10 8	10 10	10 8	7 3
„ (Black), „	10 2	10 9	10 0	10 4	6 4
Barley, .. „	—	—	—	—	—
Potatoes, .. „	4 6¼	4 1¼	4 5½	4 3¾	3 3
Hay (Clover), „	5 2½	5 2	4 7½	5 0¾	3 1½
„ (Meadow) „	4 4½	3 8¼	3 6	4 0	2 2¾
Grass Seed—					
(Perennial Rye), „	—	—	—	—	—
(Italian Rye), „	—	—	—	—	—
Flax, .. per 14 lbs.	—	—	—	—	—
Live Stock:	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Calves (young), per head	2 17 3	3 0 9	3 11 9	3 3 0	2 11 9
Store Cattle—					
Over 6 and not exceeding 12 months, per head	7 0 3	7 6 6	7 10 6	7 5 3	5 16 9
One year old and under two years, per head	10 1 3	10 4 9	10 15 0	10 6 0	8 13 6
Two years old and under three years, per head	13 8 0	13 9 6	14 4 9	13 12 3	11 9 0
Three years old and over, per head	16 3 6	15 12 3	16 1 6	15 18 3	13 12 3
Fat Cattle—					
Two years old and under three years, per head	17 3 9	17 13 6	19 7 6	17 18 3	14 8 3
Three years old and over, per head	20 8 3	21 13 3	22 8 6	21 6 9	16 14 9
Cows and Bulls, „	16 12 0	17 2 9	19 1 9	17 8 0	13 9 0
Springers—					
Cows and Heifers, „	16 16 3	17 14 9	18 7 3	17 11 6	14 10 9
Milch Cows (down calved) per head	15 12 9	16 6 9	16 6 6	16 1 9	13 3 9
Lambs (under 12 months old), .. per head	1 11 0	1 12 0	1 12 9	1 12 9	1 6 6
Store Sheep—					
One year old and under two years, per head	2 9 0	2 12 9	2 7 3	2 10 3	1 19 0
Two years old and over, per head	1 17 3	2 13 0	2 1 6	2 5 0	1 16 9
Fat Sheep—					
One year old and under two year, per head	2 19 0	3 1 9	2 14 9	2 18 3	2 5 9
Two years old and over per head	3 5 6	3 5 9	2 19 6	3 3 3	2 11 0
Young Pigs—					
8 to 10 weeks old, per head	1 8 6	1 10 6	1 12 0	1 10 6	1 9 3
Store Pigs—					
10 weeks to 4 months old, per head	1 15 9	2 0 3	1 19 3	1 18 6	1 11 0
4 months old and over, „	2 8 9	2 8 6	2 10 6	2 9 3	2 0 6
Fat Pigs, .. „	5 13 9	5 8 3	5 2 6	5 9 0	4 7 3
Sows, .. „	7 7 6	6 17 6	7 8 9	7 5 0	6 12 0
Meat, Provisions, &c.	s. d.	s. d.	s. d.	s. d.	s. d.
Beef (Live), per 112 lbs.	48 6	55 0	55 3	52 3	35 6
„ (Dead), „	85 0	96 3	96 9	91 6	62 0
Mutton (Live) „	55 9	52 6	47 3	52 0	41 0
„ (Dead) „	97 6	92 0	82 9	91 0	71 9
Pork (Dead) „	72 0	76 3	76 9	75 0	57 8
Butter (Creamery), „	130 9	136 0	132 9	133 6	103 4
„ (Factory) „	123 0	127 3	120 9	123 3	93 8
„ (Farmers) „	121 3	122 0	119 6	120 9	92 8
Eggs, .. per 120	9 6	10 6	12 6	10 7	7 11¼
Wool, .. per lb.	1 5⅜	1 5	1 6⅞	1 6⅜	1 0

Quarterly Average Prices for each Province, of Crops, Live Stock, Meat, Provisions, &c., for the Quarter ended 30th June, 1915.

Product.	Province.			
	Leinster.	Munster.	Ulster.	Connaught.
Crops:	s. d.	s. d.	s. d.	s. d.
Wheat, .. per 112 lbs.	—	—	—	—
Oats (White), .. ,,	11 1	10 9	10 8	10 2
,, (Black), .. ,,	10 7	10 3	—	—
Barley, .. ,,	—	—	—	—
Potatoes, .. ,,	4 5¼	4 11½	3 9	4 4¾
Hay (Clover), .. ,,	6 0½	4 5½	4 10¾	5 10½
,, (Meadow), .. ,,	4 5½	3 8½	3 3¾	4 5¼
Grass Seed—				
(Perennial Rye), ,,	—	—	—	—
(Italian Rye), ,,	—	—	—	—
Flax, ... per 14 lbs.	—	—	—	—
Live Stock:	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Calves (young) .. per head	3 4 9	2 12 0	2 12 9	4 0 6
Store Cattle—				
Over 6 and not exceeding 12 months, .. per head	7 13 9	7 8 3	6 19 0	6 18 0
One year old and under two years, .. per head	11 0 3	10 2 9	9 17 6	10 2 6
Two years old and under three years, per head	15 1 0	13 1 9	12 7 0	13 7 6
Three years old and over, per head	17 15 0	14 3 6	17 15 3	16 7 3
Fat Cattle—				
Two years old and under three years, per head	18 17 9	19 1 3	16 5 9	18 7 9
Three years old and over, per head	21 11 6	20 7 9	18 11 6	23 9 9
Cows and Bulls, ,,	20 4 0	16 5 0	18 2 0	19 15 0
Springers—				
Cows and Heifers, per head	18 2 0	16 13 0	17 14 9	17 15 3
Milch Cows (down calved), ,,	16 6 6	15 14 3	16 11 0	15 5 6
Lambs (under 12 months old) per head	1 12 0	1 14 3	1 14 6	1 13 0
Store Sheep—				
One year old and under two years, .. per head	2 6 3	2 11 3	2 10 9	2 11 3
Two years old and over, per head	2 1 9	1 16 0	2 7 9	2 16 6
Fat Sheep—				
One year old and under two years, per head	2 13 9	3 3 0	2 15 6	3 3 0
Two years old and over, ,,	3 1 6	3 2 9	3 2 0	3 10 9
Young Pigs—				
8 to 10 weeks old per head	1 4 6	1 10 6	1 13 9	1 12 0
Store Pigs—				
10 weeks to 4 months old, per head	2 3 0	1 11 0	—	—
4 months old and over, ,,	2 16 3	2 6 6	—	2 19 3
Fat Pigs, .. ,,	5 7 6	5 0 9	—	6 6 9
Sows, ... ,,	7 0 0	8 4 3	6 12 0	8 15 9
Meat, Provisions, &c.	s. d.	s. d.	s. d.	s. d.
Beef (Live), .. per 112 lbs.	52 3	—	—	—
,, (Dead), .. ,,	91 6	—	—	—
Mutton (Live), .. ,,	52 0	—	—	—
,, (Dead), .. ,,	91 0	—	—	—
Pork (Dead), .. ,,	67 9	75 9	70 6	71 6
Butter (Creamery), ,,	136 0	133 3	—	—
,, (Factory), ,,	122 6	123 3	—	—
,, (Farmers), ,,	118 6	121 0	115 3	120 6
Eggs, .. per 120	10 10	11 0	—	9 11
Wool, ... per lb.	1 6⅝	1 7⅜	—	1 5

Number of Animals included in Returns furnished under the Markets and Fairs (Weighing of Cattle) Act, 1891, Sections 3 and 4, during the Quarter ended 30th June, 1915.

Week Ended		Fat Cattle.					Fat Sheep.			
		Dublin.		Belfast.		Total Number of Cattle included in Returns.	Dublin.		Belfast.	Total Number of Sheep included in Returns.
		Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	Mr. John Robson, Auctioneer.		Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	
1915.										
April	1	59	133	71	49	312	—	197	—	197
"	8	55	68	61	52	236	15	143	—	158
"	15	61	111	70	55	297	—	141	—	141
"	22	66	132	68	49	315	—	216	—	216
"	29	61	122	67	48	298	—	212	—	212
May	6	37	41	62	66	206	—	200	—	200
"	13	42	55	77	64	238	—	184	—	184
"	20	58	114	68	50	290	—	233	—	233
"	27	75	63	26	60	224	—	172	—	172
June	3	69	87	34	55	245	—	213	—	213
"	10	49	90	33	72	244	—	232	—	232
"	17	56	70	33	55	214	—	338	—	338
"	24	51	126	30	51	258	—	296	—	296
Totals,		739	1,212	700	726	3,377	15	2,777	—	2,792

Weekly Average Prices of Wheat, Oats, and Barley, per 112 lbs. computed from Market Returns of certain quantities of these Cereals supplied by Officers of Customs and Excise, during the Quarter ended 30th June, 1915.

Returns received in the Week ended		Wheat.		Oats.		Barley.	
		Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity
1915.		s. d.	Cwts. of 112 lbs.	s. d.	Cwts. of 112 lbs.	s. d.	Cwts. of 112 lbs.
April	3	—	—	10 3	3,020	—	—
"	10	—	—	10 3	2,264	—	—
"	17	13 2	20	10 5	3,595	8 6	18
"	24	12 0	10	10 4	3,479	—	—
May	1	13 7	40	10 5	1,916	—	—
"	8	—	—	10 6	3,027	—	—
"	15	—	—	10 10	2,640	—	—
"	22	—	—	10 11	3,506	—	—
"	29	—	—	10 9	2,293	8 8	400
June	5	—	—	10 9	2,102	8 8	40
"	12	12 0	40	10 4	2,353	—	—
"	19	—	—	10 3	2,199	—	—
"	26	—	—	10 8	2,306	—	—

Quarterly Average Prices of Fat Cattle and Fat Sheep, per 112 lbs., Live Weight, sold in Dublin Markets during the period ended 30th June, 1915, and also for the corresponding period during eighteen preceding years.

Year.	Fat Cattle.	Fat Sheep.	Year.
	£ s. d.	£ s. d.	
1915,	2 12 3	2 12 0	1915.
1914,	1 15 6	2 1 0	1914.
1913,	1 19 2	2 4 1	1913.
1912,	1 19 1	1 19 5	1912.
1911,	1 15 5	1 16 8	1911.
1910,	1 18 3	2 1 10	1910.
1909,	1 14 9	1 14 4	1909.
1908,	1 14 10	2 2 3	1908.
1907,	1 14 0	2 2 8	1907.
1906,	1 12 6	2 2 10	1906.
1905,	1 12 9	1 19 10	1905.
1904,	1 14 4	2 0 7	1904.
1903,	1 14 5	2 0 4	1903.
1902,	1 17 4	1 17 0	1902.
1901,	1 13 4	1 18 0	1901.
1900,	1 14 11	2 0 1	1900.
1899,	1 13 7	1 16 4	1899.
1898,	1 10 7	1 14 9	1898.
1897,	1 13 3	1 17 11	1897.

BUTTER PRICES DURING THE QUARTER

ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW,"

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the an Irish Creamery would be *5s.* to *7s.* per cwt. less than freight, commission,

Country of Origin.	Type of Package.	Place of Sale.	Week ended April 3rd.	Week ended April 10th.	Week ended April 17th.	Week ended April 24th.
			Per cwt. *s. s.*	Per cwt. *s. s.*	Per cwt. *s. s.*	Per cwt. *s. s.*
IRELAND—Creamery Butter,	Kiels, kegs, or pyramid boxes	London, .	—	—	—	—
		Liverpool, .	—	—	—	136–138
		Bristol, .	—	138–140	—	—
		Cardiff, .	138–149	132–141	134–140	136–140
		Manchester, .	—	—	132–136	134–138
		Birmingham, .	—	—	134–136	136–138
		Glasgow, .	—	—	—	138–140
		Limerick, .	—	—	—	—
		Cork, .	—	—	—	—
		Belfast, .	—	—	—	—
		Dublin, .	135/4–140	135/4	130–135/4	136–140
	1lb. rolls, in boxes, Salted or Unsalted.	F.O.R., .	144/8	135/4–144/8	140–144/8	140–144/8
Factories, .		London, .	—	—	—	—
		Liverpool, .	—	—	—	—
		Bristol, .	—	—	—	—
		Cardiff, .	132	127	127	125–126
		Manchester, .	—	—	—	—
Farmers' Butter,	Firkins 1st, Export Price	Cork, .	133–140	131–133	131–133	132–139
	Do. 2nd „	Cork, .	121–122	117–123	120–126	125–129
	Do. 3rd „	Cork, .	117–119	116–119	117–118	—
	Fresh, .	Cork, .	125–127	125	125–131	131–132
FRANCE, .	12×2lb. rolls,	London, .	Per doz. lbs. 13/6–16/6	Per doz. lbs. 14/6–16/6	Per doz. lbs. 14/6–16/6	Per doz. lbs. 14/6–16/6
	Paris baskets,	do., .	Per cwt. 136–141	Per cwt. 136–141	Per cwt. 136–141	Per cwt. 136–141
DENMARK AND SWEDEN.		Copenhagen Quotation.	121 Kr. per 50 Kilos = 126/11 per cwt.	121 Kr. per 50 Kilos = 130/10 per cwt.	121 Kr. per 50 Kilos = 133/8 per cwt.	121 Kr. per 50 Kilos = 133/3 per cwt.
		Average over-price.	—	—	—	—
	Kiels, .	London, .	138–142	138–142	142–144	142–144
		Liverpool, .	137–143	138–144	139–145	140–146
		Bristol, .	—	—	—	—
		Cardiff, .	145–146	145	146	143
		Manchester, .	138–144	138–143	139–145	140–148
		Birmingham, .	141–144	139–142	143–144	144–146
		Newcastle-on-Tyne,	139–141	139–142	140–144	141–145
		Glasgow, .	139–140	139–140	142–143	142–143
		Leith, .	—	138–140	141	142
		Hull, . .	140–146	135–137	139–141	140–142
	1lb. rolls, 10×24 lb. boxes.	F.O.R. London	—	—	—	—
FINLAND .	Kiels, .	Manchester, .	136–140	136–141	136–141	138–143
		Liverpool, .	—	—	—	—
		Hull, . .	137–146	130–131	134–135	134–135
		Cardiff, .	—	—	—	—

ENDED 30TH JUNE, 1915.

"GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED								
MAY.					JUNE.			
1st.	8th.	15th.	22nd.	29th.	5th.	12th.	19th.	26th.
Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
136–138	140–142	140–144	140–146	138–144	134–140	134–138	136–142	140–146
138–140	140–142	142–148	140–148	137–142	134–139	130–139	136–143	140–144
134–138	140–144	144	146–148	142–148	138–144	138–142	140–144	142–145
139–142	142–145	146–148	145–149	144–147	140–144	138–144	142–144	142–148
135–142	140–145	143–147	145–150	141–148	133–141	135–141	138–144	142–147
138–139	141–142	144–146	146–148	142–145	136–139	135–138	140–142	144–146
138–140	139–140	144–145	144–145	140–142	136–138	136–138	138–140	142–143
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
140	140	142–144/8	144/8	138–140	133–135/4	132–135	137–140	140–142
144/8–149/4	144/8–149/4	144/8–149/4	144/8–149/4	140–144/8	135/4–144/8	140–144/8	140–144/8	144/8–149/4
—	—	—	—	—	128–132	126–130	126–134	126–134
—	—	—	133–135	130–132	126–130	124–127	127–129	127–129
—	—	—	132–138	132–138	132–136	130–134	130–134	130–136
128	129	128–134	136–138	136	132–134	132	132–135	132
—	—	—	—	—	—	—	—	—
128–137	125–128	124–129	127–128	126	124–128	125	124–125	124
125	120–124	120–124	124–125	124	119–124	119–121	118–121	117–121
115–119	116–117	116–117	—	116	110–117	113	—	118
134–136	133–136	132–136	132	127–132	123–126	123–126	125–126	125
Per doz. lbs. 13–16	Per doz. lbs. 13–16	Per doz. lbs. 13–16	Per doz. lbs. 13–16	Per doz. lbs. 13/6–16	Per doz. lbs. 13/6–16	Per doz. lbs. 13/6–15/6	Per doz. lbs. 13/6–15/6	Per doz. lbs. 13/6–15/6
Per cwt. 132–138	Per cwt. 132–138	Per cwt. 132–141	Per cwt. 132–141	Per cwt. 135–144	Per cwt. 135–144	Per cwt. 131–140	Per cwt. 131–140	Per cwt. 131–140
122 Kr. per 50 Kilos = 134/5 per cwt.	125 Kr per 50 Kilos = 138/1 per cwt.	129 Kr. per 50 Kilos = 142/11 per cwt.	129 Kr. per 50 Kilos = 142/11 per cwt.	123 Kr. per 50 Kilos = 137/6 per cwt.	120 Kr. per 50 Kilos = 134/6 per cwt.	122 Kr. per 50 Kilos = 137/1 per cwt.	125 Kr. per 50 Kilos = 141/- per cwt.	125 Kr. per 50 Kilos = 141/1 per cwt.
—	—	—	—	—	—	—	—	—
144–146	148–154	154–158	154–158	148–150	144–148	146–149	146–149	150–154
141–148	145–152	150–159	150–159	148–156	144–152	142–146	142–152	150–156
—	—	—	—	—	—	—	—	—
148	150	156	160	162	158	150	154	156
143–149	147–153	149–155	154–160	152–158	142–149	144–149	145–153	153–158
145–147	149–150	153–154	156–158	153–156	144–148	143–146	146–150	155–156
142–147	144–152	148–152	151–154	142–152	141–146	142–147	144–156	150–154
144–145	146–147	152–153	153–154	150–151	146–147	143–144	149–150	152–153
144	146	150–152	155	154	140–144	143	148	153/6
140–142	140–144	149–151	151–153	146–153	142–145	140–141	142–144	145–153
—	—	—	—	—	—	—	—	—
139–144	142–148	146–152	150–156	147–154	139–145	139–145	141–146	145 150
—	—	—	—	—	—	—	—	—
134–135	138–139	145–147	148–150	144–148	140–144	136–138	138–140	140–150
—	—	—	—	—	—	—	—	—

[Continued on pages 826 and 827.

BUTTER PRICES DURING THE QUARTER

Abstracted from "The Grocer," "Grocer's Review,"

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the
an Irish Creamery would be 5*s.* to 7*s.* per cwt. less than
freight, commission,

Country of Origin.	Type of Package.	Place of Sale.	Week ended. April 3rd.	10th.	17th.	24th.
			Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
Russia and Siberia,	Kiels,	London,	130–132	128–132	128–132	128–132
		Liverpool,	—	—	—	—
		Bristol,	132–138	132–138	132–136	132–137
		Cardiff,	—	—	—	—
		Manchester,	132–136	131–134	130–134	130–135
		Birmingham,	133–136	132–134	130–132	130–132
		Glasgow,	—	—	—	—
		Leith,	—	—	—	—
		Hull,	—	—	—	—
Holland,	Boxes,	London,	—	—	132–134	—
			Per doz. lbs	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
	Rolls,	do.,	—	—	15/6–16	15–16
	Boxes,	Glasgow,—	Per cwt.	Per cwt.	Per cwt.	Per cwt.
		Fresh,	—	—	—	—
		Salt,	—	—	—	—
		Manchester,	—	—	—	—
		Hull,	140–145	138–140	—	—
			Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
Italy,	Rolls,	London,	—	—	—	—
			Per cwt.	Per cwt.	Per cwt.	Per cwt.
Canada,	56 lb. Boxes,	London,	—	—	—	—
		Liverpool,	—	—	—	—
		Bristol,	—	—	—	—
		Cardiff,	—	—	—	—
		Birmingham,	—	—	—	—
		Manchester,	—	—	—	—
		Glasgow,	—	—	—	—
Australia and New Zealand, *	Boxes,	London,	A.s.130–134	A.s.128–132	A.s.128–132	A.s.128–132
			u.132–136	u. 132–136	u. 130–136	u. 130–136
			Z. 134–140	Z. 134–142	Z. 132–140	Z. 132–140
		Liverpool,	A. 131–139	A. 134–137	A. 134–137	A. 133–137
			Z. 137–142	Z. 137–139	Z. 137–139	Z. 136–139
		Bristol,	A. 132–140	A. 132–138	A. 132–138	A. 132–138
			Z. 140–142	Z. 138–142	Z. 138–140	Z. 138–140
		Cardiff,	A. 137–142	A. 132–140	A. 131–136	A. 129–136
			Z. 140–144	Z. 138–141	Z. 136–142	Z. 136–140
		Manchester,	A. —	A. —	A. —	A. —
			Z. 138–142	Z. 136–143	Z. 136–142	Z. 138–140
		Birmingham,	A. 137–139	A. 133–136	A. 132–134	A 132–134
			Z. 140–142	Z. 138–140	Z. 138–139	Z. 138–139
		Glasgow,	A. 138–139	A. 138–139	A. 138–139	A. 138–139
			Z. 141–142	Z. 141–142	Z. 141–142	Z. 141–142
		Leith,	A. —	A. —	A. 130–136	A. 130–136
			Z. —	Z. —	Z. —	Z. —
		Hull,	A. 137–138	A. 136–138	A. 133–134	A. 134–135
			Z. 138–140	Z. 136–138	Z. 134–135	Z. 134–136
Argentina,	Boxes,	London,	130–134	128–134	126–132	126–132
		Liverpool,	131–137	132–135	132–135	128–135
		Bristol,	—	—	—	—
		Cardiff,	—	—	—	—
		Manchester,	—	141–143	—	134–136
		Birmingham,	—	—	132–134	132–134
		Glasgow,	137	137	—	—
United States,	Tubs and boxes,	London,	—	—	—	—
		Liverpool,	—	—	—	—
		Bristol,	—	128–130	126–130	126–130
		Cardiff,	—	—	—	—
		Manchester,	—	—	—	—

* A.—Australia. Z.—New Zealand. s.—salted. u.—unsalted

ENDED 30TH JUNE, 1915—*Continued.*

"GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED.								
MAY					JUNE			
1st.	8th.	15th.	22nd.	29th.	5th.	12th.	19th.	26th.
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.	s. s.
128–132	130–134	132–136	—	—	130–134	130–132	130–132	128–132
132–136	132–136	—			—	132–136	132–136	134–136
132–136	132–136	132–140	132–136	134–140	—	134–138	134–138	134–138
—	—	—	—	—	—	—	—	—
130–134	130–134	132	—	—	—	—	132–136	132–136
129–132	132–134	134–136	—	—	—	133–135	133–135	133–136
—	—	—	—	—	—	—	—	—
—	133–134	—	—	—	—	—	130	132
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
—	—	16/6–17	—	16–17	16–16/6	16–16/6	16–16/6	16–16/6
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	141–142	149–150	154–155	150–153	145–147	142–144	142–144	144–146
Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
—	—	—	—	—	—	—	—	—
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
A.s.130–134	A.s.132–136	A.s.134–138	A.s.138–142	A.s.138–142	A.s.136–142	A.s.136–140	A.s.136–142	A.s.138–142
u.132–136	u. 134–138	u. 136–140	u.140–142	u.138–142	u.136–142	u.136–140	u.136–142	u.138–142
Z. 134–142	Z. 138–144	Z. 140–144	Z. 144–148	Z. 142–146	Z. 140–144	Z. 140–144	Z. 140–144	Z. 142–146
A. 133–138	A. 135–140	A. 138–144	A. 138–143	A. 136–142	A. 138–140	A. 136–138	A. —	A. 138–142
Z. 136–142	Z. 138–144	Z. 142–148	Z. 142–149	Z. 140–147	Z. 140–146	Z. 139–142	Z. 142–144	Z. 142–145
A. 134–138	A. 136–142	A. 138–144	A. 140–144	A. 142–144	A. 138–142	A. 138–140	A. 138–140	A. 140
Z. 140–142	Z. 142–144	Z. 145–147	Z. 147–150	Z. 147–152	Z. 145–148	Z. 144–148	Z. 145–148	Z. 148–150
A. 132–138	A. 132–140	A. 137–144	A. 134–142	A. 134–144	A. 134–138	A. —	A. 138	A. —
Z. 140–142	Z. 142–145	Z. 146–148	Z. 149	Z. 146	Z. 144	Z. 144	Z. —	Z. —
A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —
Z. 138–142	Z. 143–146	Z. 143–144	Z. 146–149	Z. 144–149	Z. 142–146	Z. 142–143	Z. —	Z. —
A. 132–134	A. 134–138	A. 136–138	A. —	A. —	A. —	A. —	A. —	A. —
Z. 138–139	Z. 141–142	Z. 144–146	Z. 148–149	Z. 147–148	Z. 145–147	Z. —	Z. —	Z. —
A. 138–139	A. 139–140	A. 141–142	A. 144–145	A. —	A. —	A. —	A. —	A. —
Z. 141–142	Z. 142	Z. 145–146	Z. 149–150	Z. 146–148	Z. 144–145	Z. 143–144	Z. —	Z. —
A. 136	A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —
Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —
A. 134–135	A. 134–136	A. 142–144	A. 140–142	A. 138–142	A. 136–138	A. 136–137	A. —	A. —
Z. 135–136	Z. 136–138	Z. 143–145	Z. 142–144	Z. 140–144	Z. 138–140	Z. 137–138	Z. —	Z. —
128–132	132–138	134–138	138–142	138–142	134–136	136–138	136–138	136–140
130–134	134–138	136–140	137–140	134–138	134–136	130–132	130–132	—
—	136–138	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
	—	138–140	138–140	138–140	136–138	—	—	—
132–134	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
126–130	126–130	128–130	128–130	128–130	126–128	126–128	125 –128	125–128
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—

TABLES SHOWING THE EXPORTS

TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT
the PORTS OF EMBARKATION

PORTS IN IRELAND.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina,	29	—	—	1	80	—	110	5	—	10	15
Belfast,	5,140	24.865	1,717	3,700	278	131	35,831	342	—	2,703	3,045
Coleraine	—	—	—	—	—	—	—	—	—	—	—
Cork,	1,502	6,670	387	553	17	171	9,300	330	1,774	4,776	6,880
Drogheda,	167	8	34	4	—	—	213	—	—	—	—
Dublin,	19,431	14,914	6,630	240	20	1,034	42,269	19,184	1	59,751	78,936
Dundalk,	3,903	4,245	430	90	794	20	9,482	827	—	11,541	12,368
Greenore,	99	2,658	592	631	—	—	3,980	469	—	631	1,100
Larne,	254	8,621	28	101	9	680	9,693	34	83	26	143
Limerick,	—	—	—	—	—	—	—	—	—	—	—
Londonderry,	7,197	18,122	247	523	520	3,775	30,384	853	1,248	1,920	4,021
Milford,	—	—	—	—	—	—	—	—	—	—	—
Mulroy,	—	—	—	—	—	—	—	—	—	—	—
Newry,	159	154	—	—	—	—	313	39	—	1,088	1,127
Portrush,	—	60	2	1	—	—	63	—	—	—	—
Sligo,	130	186	—	—	—	—	316	204	—	268	472
Waterford,	4,631	7,112	2	19	—	394	12,158	2,279	—	5,351	7,630
Westport,	8	1	1	—	55	—	65	2	—	19	21
Wexford,	—	—	—	—	—	—	—	—	—	—	—
TOTAL,	42,650	87,616	10,070	5,863	1,773	6,205	154,177	24,568	3,106	88,084	115,758

TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT
the PORTS OF DEBARKATION

PORTS IN GREAT BRITAIN.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ardrossan,	—	—	—	—	—	—	—	—	—	—	—
Ayr,	480	16,095	72	351	26	99	17,123	112	83	81	276
Barrow,	—	—	—	—	—	—	—	—	—	—	—
Bristol,	344	3,995	114	146	—	207	4,806	271	1,416	124	1,811
Cardiff,	—	—	—	—	—	—	—	—	—	—	—
Dover	—	—	—	—	—	—	—	—	—	—	—
Falmouth,	—	—	—	—	—	—	—	—	—	—	—
Fishguard,	865	6,073	197	355	—	317	7,807	508	358	2,574	3,440
Fleetwood,	1,850	839	999	824	—	—	4,512	30	—	1,227	1,257
Glasgow,	4,701	17,202	1,483	2,620	895	4,595	31,496	1,127	—	3,117	4,244
Greenock,	381	7,449	10	47	42	—	7,929	30	—	302	332
Heysham,	2,730	10,982	2,482	433	4	33	16,664	1,062	1,248	5,439	7,749
Holyhead,	5,793	9,921	3,553	835	—	291	20,393	6,514	1	16,491	23,006
Liverpool,	20,710	7,586	1,118	171	797	61	30,443	11,677	—	49,259	60,936
London,	—	—	—	—	—	—	—	—	—	—	—
Manchester,	4,038	35	14	—	—	—	4,087	3,237	—	9,268	12,505
Newhaven,	—	—	—	—	—	—	—	—	—	—	—
Plymouth,	—	—	—	—	—	—	—	—	—	—	—
Preston,	—	—	—	—	—	—	—	—	—	—	—
Silloth,	508	80	3	—	—	—	591	—	—	202	202
Southampton,	—	—	—	—	—	—	—	—	—	—	—
Stranraer,	250	7,359	25	81	9	602	8,326	—	—	—	—
Swansea,	—	—	—	—	—	—	—	—	—	—	—
TOTAL,	42,650	87,616	10,070	5,863	1,773	6,205	154,177	24,568	3,106	88,084	115,758

AND IMPORTS OF ANIMALS.

I.

BRITAIN during the Three Months ended 30TH JUNE, 1915, showing IN IRELAND.

Pigs.			Goats.	Horses.				Mules or Jennets	Asses.	Total Animals	Ports in Ireland.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
33	—	33	—	—	—	—	—	—	—	158	Ballina.
167	2,036	2,203	1	7	915	1,878	2,800	—	6	43,886	Belfast.
—	—	—	—	—	—	—	—	—	—	—	Coleraine.
2,039	102	2,141	1	—	94	155	249	—	13	18,584	Cork.
76	—	76	1	—	—	—	—	—	—	290	Drogheda.
11,325	41	11,366	21	49	1,064	838	1,951	—	20	134,563	Dublin.
1,953	408	2,361	183	1	31	15	47	—	1	24,442	Dundalk.
342	611	953	153	—	905	1,192	2,097	—	184	8,467	Greenore.
4	323	327	1	1	122	255	378	—	1	10,543	Larne.
—	—	—	—	—	—	—	—	—	—	—	Limerick.
531	1	532	—	—	62	94	156	—	5	35,098	Londonderry.
142	—	142	—	—	—	—	—	—	—	142	Milford.
55	—	55	—	—	—	—	—	—	—	55	Mulroy.
19	—	19	1	—	—	—	—	—	—	1,460	Newry.
45	—	45	—	—	—	—	—	—	4	112	Portrush.
2,313	—	2,313	3	—	1	1	2	—	—	3,106	Sligo.
5,129	48	5,177	1	—	417	424	841	—	1	25,808	Waterford.
—	—	—	—	—	—	—	—	—	—	86	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
24,173	3,570	27,743	366	58	3,611	4,852	8,521	—	235	306,800	TOTAL.

II.

BRITAIN during the Three Months ended 30TH JUNE, 1915, showing IN GREAT BRITAIN.

Pigs.			Goats.	Horses.				Mules or Jennets	Asses.	Total Animals	Ports in Great Britain.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings.	Total.				
—	—	—	—	1	204	624	829	—	1	830	Ardrossan.
115	2,035	2,150	—	2	7	4	13	—	1	19,563	Ayr.
—	—	—	—	—	—	—	—	—	—	—	Barrow.
676	—	676	—	—	36	31	67	—	12	7,372	Bristol.
—	—	—	—	—	—	—	—	—	—	—	Cardiff,
—	—	—	—	—	—	—	—	—	—	—	Dover
—	—	—	—	—	—	—	—	—	—	—	Falmouth
4,432	102	4,534	1	—	412	463	875	—	2	16,659	Fishguard.
—	—	—	1	2	381	663	1,046	—	1	6,817	Fleetwood
2,122	3	2,125	1	—	146	255	401	—	9	38,276	Glasgow.
23	—	23	—	—	3	5	8	—	1	8,293	Greenock.
1,204	26	1,230	—	1	251	379	631	—	2	26,276	Heysham.
9,132	625	9,757	165	48	1,771	1,854	3,673	—	203	57,197	Holyhead.
6,373	456	6,829	193	3	210	248	461	—	2	98,864	Liverpool,
—	—	—	—	—	—	—	—	—	—	—	London.
96	—	96	4	—	18	10	28	—	—	16,720	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	—	—	—	—	36	46	82	—	—	82	Plymouth.
—	—	—	—	—	9	5	14	—	—	14	Preston.
—	—	—	—	—	1	3	4	—	—	797	Silloth.
—	—	—	—	—	5	7	12	—	—	12	Southampton.
—	328	323	1	1	121	255	377	—	1	9,028	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Swansea.
24,173	3,570	27,743	366	58	3,611	4,352	8,521	—	235	306,800	TOTAL.

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT the PORTS OF

PORTS IN IRELAND.	CATTLE.							SHEEP.			
	Fat	Stores (fattening)	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina,	—	—	—	—	—	—	—	—	—	—	—
Belfast,	—	—	—	—	34	—	34	107	—	—	107
Coleraine,	—	—	—	—	—	—	—	—	—	—	—
Cork,	—	1	—	—	—	—	1	—	1	—	1
Drogheda,	—	—	—	—	—	—	—	—	—	—	—
Dublin,	—	23	10	—	—	5	38	11	3	—	14
Dundalk,	—	—	—	—	—	—	—	—	—	—	—
Greenore,	—	—	—	—	—	—	—	—	—	—	—
Larne,	—	2	—	—	3	—	5	78	—	—	78
Limerick,	—	—	—	—	—	—	—	—	—	—	—
Londonderry,	—	10	—	—	—	1	11	—	126	—	126
Milford,	—	—	—	—	—	—	—	—	—	—	—
Mulroy,	—	—	—	—	—	—	—	—	—	—	—
Newry,	—	—	—	—	—	—	—	—	—	—	—
Portrush,	—	—	—	—	—	—	—	—	—	—	—
Sligo,	—	—	—	—	—	—	—	—	—	—	—
Waterford,	—	2	—	—	—	—	2	—	4	—	4
Westport,	—	—	—	—	—	—	—	—	—	—	—
Wexford,	—	—	—	—	—	—	—	—	—	—	—
TOTAL,	—	38	10	—	37	6	91	196	134	—	330

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT the PORTS of EMBARKATION

PORTS IN GREAT BRITAIN.	CATTLE.							SHEEP.			
	Fat.	Stores (fattening).	Milch Cows.	Springers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ardrossan,	—	—	—	—	10	—	10	—	—	—	—
Ayr,	—	—	—	—	10	—	10	185	—	—	185
Barrow,	—	—	—	—	—	—	—	—	—	—	—
Bristol,	—	1	—	—	—	—	1	—	—	—	—
Cardiff,	—	—	—	—	—	—	—	—	—	—	—
Falmouth,	—	6	10	—	—	5	21	—	—	—	—
Fishguard,	—	2	—	—	—	—	2	—	1	—	1
Fleetwood,	—	—	—	—	1	—	1	—	—	—	—
Glasgow,	—	3	—	—	3	1	7	11	126	—	137
Greenock,	—	9	—	—	—	—	9	—	—	—	—
Heysham,	—	—	—	—	2	—	2	—	1	—	1
Holyhead,	—	15	—	—	—	—	15	—	2	—	2
Liverpool,	—	—	—	—	8	—	8	—	4	—	4
London,	—	—	—	—	—	—	—	—	—	—	—
Manchester,	—	—	—	—	—	—	—	—	—	—	—
Newhaven,	—	—	—	—	—	—	—	—	—	—	—
Plymouth,	—	—	—	—	—	—	—	—	—	—	—
Preston,	—	—	—	—	—	—	—	—	—	—	—
Silloth,	—	—	—	—	—	—	—	—	—	—	—
Southampton,	—	—	—	—	—	—	—	—	—	—	—
Stranraer	—	2	—	—	3	—	5	—	—	—	—
Swansea,	—	—	—	—	—	—	—	—	—	—	—
TOTAL,	—	38	10	—	37	6	91	196	134	—	330

III.

Britain during the Three Months ended 30th June, 1915, showing Debarkation in Ireland.

Pigs. Fat.	Pigs. Stores.	Pigs. Total.	Goats.	Horses. Stallions.	Horses. Mares.	Horses. Geldings.	Horses. Total.	Mules or Jennets	Asses.	Total Animals	Ports in Ireland.
—	—	—	—	—	—	—	—	—	—	—	Ballina.
—	—	—	—	31	36	10	77	—	—	218	Belfast.
—	—	—	—	—	—	—	—	—	—	—	Coleraine.
—	11	11	2	2	72	62	136	—	—	151	Cork.
—	—	—	—	—	—	—	—	—	—	—	Drogheda.
—	—	—	2	250	342	83	675	1	—	730	Dublin.
—	—	—	—	—	4	2	6	—	—	6	Dundalk.
—	—	—	—	1	133	69	203	—	—	203	Greenore.
—	—	—	—	13	12	8	33	—	—	116	Larne.
—	—	—	—	—	—	—	—	—	—	—	Limerick.
—	—	—	—	2	10	1	13	—	—	150	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Milford.
—	—	—	—	—	—	—	—	—	—	—	Mulroy.
—	—	—	—	—	—	—	—	—	—	—	Newry.
—	—	—	—	—	—	—	—	—	—	—	Portrush.
—	—	—	—	—	1	—	1	—	—	1	Sligo.
—	—	—	3	5	60	69	134	—	—	143	Waterford.
—	—	—	—	—	—	—	—	—	—	—	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
—	11	11	7	304	670	304	1,278	1	—	1,718	Total.

IV.

Britain during the Three Months ended 30th June, 1915, showing in Great Britain.

Pigs. Fat.	Pigs. Stores.	Pigs. Total.	Goats.	Horses. Stallions.	Horses. Mares.	Horses. Geldings.	Horses. Total.	Mules or Jennets	Asses.	Total Animals	Ports in Great Britain.
—	—	—	—	—	—	1	1	—	—	11	Ardrossan.
—	—	—	—	1	1	1	3	—	—	198	Ayr.
—	—	—	—	—	—	—	—	—	—	—	Barrow.
—	—	—	—	2	42	53	97	—	—	98	Bristol.
—	—	—	—	—	—	—	—	—	—	—	Cardiff.
—	—	—	—	—	—	—	—	—	—	21	Falmouth.
—	—	—	5	5	89	77	171	—	—	179	Fishguard.
—	—	—	—	26	22	3	51	—	—	52	Fleetwood.
—	—	—	—	8	15	6	29	—	—	173	Glasgow.
—	—	—	—	—	2	1	3	—	—	12	Greenock.
—	—	—	—	1	9	2	12	—	—	15	Heysham.
—	—	—	2	245	465	148	858	1	—	878	Holyhead.
—	7	7	—	1	11	3	15	—	—	34	Liverpool.
—	—	—	—	—	—	—	—	—	—	—	London.
—	—	—	—	—	—	—	—	—	—	—	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	4	4	—	—	1	1	2	—	—	6	Plymouth.
—	—	—	—	—	—	—	—	—	—	—	Preston.
—	—	—	—	2	1	—	3	—	—	3	Silloth.
—	—	—	—	—	—	—	—	—	—	—	Southampton.
—	—	—	—	13	12	8	33	—	—	38	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Swansea.
—	11	11	7	304	670	304	1,278	1	—	1,718	Total.

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the
showing the PORTS of

PORT IN IRELAND.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	86	—	—	86	—	—	—
DUBLIN, .	25	30	—	—	55	—	—	—
TOTAL, .	25	116	—	—	141	—	—	—

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the
showing the PORTS of DEBARKATION

PORT IN ISLE OF MAN.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS .	25	116	—	—	141	—	—	—

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the
showing the PORTS of

PORT IN IRELAND.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	—	—	—	—	—	—	—
DUBLIN, .	—	—	—	—	—	—	—	—
TOTAL, .	—	—	—	—	—	—	—	—

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the
showing the PORTS of EMBARKATION

PORT IN ISLE OF MAN.	CATTLE					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	—	—	—	—	—	—	—	—

Isle of Man during the Three Months ended 30th June, 1915, **Embarkation** in **Ireland.**

Swine.			Goats.	Horses.				Mules or Jennets.	Asses.	Total Animals.	Port in Ireland.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
—	2	2	—	—	2	3	5	—	—	93	Belfast.
—	—	—	—	—	—	—	—	—	—	55	Dublin.
—	2	2	—	—	2	3	5	—	—	148	Total

Isle of Man during the Three Months ended 30th June, 1915, in the **Isle of Man.**

Swine.			Goats.	Horses.				Mules or Jennets.	Asses.	Total Animals.	Port in Isle of Man.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
—	2	2	—	—	2	3	5	—	—	148	Douglas.

Isle of Man during the Three Months ended 30th June, 1915, **Debarkation** in **Ireland.**

Swine.			Goats.	Horses.				Mules or Jennets.	Asses.	Total Animals.	Port in Ireland.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	—	—	—	—	—	—	Belfast.
—	—	—	—	—	—	—	—	—	—	—	Dublin.
—	—	—	—	—	—	—	—	—	—	—	Total.

Isle of Man during the Three Months ended 30th June, 1915, in the **Isle of Man.**

Swine.			Goats.	Horses.				Mules or Jennets.	Asses.	Total Animals.	Port in Isle of Man.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	—	—	—	—	—	—	Douglas.

COASTING AND

Return of the Number of Animals Shipped to and from Places in the Places of Embarkation

Irish Ports.	Cattle.					Sheep.			Swine.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs	Total.	Fat.	Stores.	Total.
Cork to Aghada Pier, .	—	—	—	—	—	—	—	—	—	—	—
" to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
" to Spike Island, .	—	—	—	—	—	—	—	—	—	—	—
" to Queenstown, .	—	—	—	—	—	—	—	—	—	—	—
" to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	—	—	—	—	—	—	—	—	—	—	—
Aghada Pier to Cork, .	—	—	—	—	—	—	—	—	—	—	—
Belfast " .	—	—	—	—	—	—	—	—	—	—	—
Spike Island " .	—	—	—	—	—	—	—	—	—	—	—
Queenstown " .	—	—	—	—	—	—	—	—	—	—	—
Waterford " .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	—	—	—	—	—	—	—	—	—	—	—
Waterford to Ballyhack,	—	—	—	—	—	—	—	—	—	—	—
" to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
" to Duncannon	—	80	—	27	107	—	—	—	8	—	8
Total, . .	—	80	—	27	107	—	—	—	8	—	8
Ballyhack to Waterford,	46	3	—	—	49	94	84	178	21	11	32
Dublin to Belfast, .	41	—	—	—	41	1,016	—	1,016	—	—	—
Duncannon to Waterford,	164	5	—	—	169	39	16	55	202	—	202
Kilrush to Limerick, .	—	—	—	—	—	—	—	—	29	—	29
Kildysart " .	—	—	—	—	—	—	—	—	—	—	—
Glin, " .	—	—	—	—	—	—	—	—	—	—	—
Portumna, " .	—	—	—	—	—	—	—	—	—	—	—
Tarbert, " .	—	—	—	—	—	—	—	—	—	—	—
Kilkee, " .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	—	—	—	—	—	—	—	—	29	—	29
Milford to Portrush,	—	—	—	—	—	—	—	—	—	—	
Belfast to Dublin, .	7	5	—	20	32	113	—	113	—	—	—
Londonderry to Mulroy,	—	—	—	—	—	—	—	—	—	—	—
Moville to Londonderry,	4	11	—	—	15	—	—	—	—	—	—
Ballina to Sligo, . .	2	—	—	—	2	—	—	—	3	—	3
Belmullet " . .	3	—	—	—	3	—	—	—	225	—	225
Westport " . .	—	—	—	—	—	—	—	—	—	—	—
Total, .	5	—	—	—	5	—	—	—	228	—	228
Sligo to Ballina, . .	—	—	—	—	—	—	—	—	—	—	—
Milford to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy to Milford, .	—	—	—	—	—	—	—	—	—	—	—
Dublin to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Leitbeg to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Total, . .	267	104	—	47	418	1,262	100	1,362	488	11	499

INLAND NAVIGATION.

Ireland during the Three Months ended 30TH JUNE, 1915, showing and Debarkation.

Goats.	Horses. Stallions.	Horses. Mares.	Horses. Geldings.	Horses. Total.	Mules or Jennets.	Asses.	Total Animals.	IRISH PORTS.
—	—	—	—	—	—	—	—	Cork to Aghada Pier.
—	—	—	—	—	—	—	—	" to Belfast.
—	—	—	—	—	—	—	—	" to Spike Island.
—	—	—	—	—	—	—	—	" to Queenstown.
—	—	—	—	—	—	—	—	" to Waterford.
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	—	Aghada Pier to Cork.
—	—	—	—	—	—	—	—	Belfast "
—	—	—	—	—	—	—	—	Spike Island "
—	—	—	—	—	—	—	—	Queenstown "
—	—	—	—	—	—	—	—	Waterford "
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	—	Waterford to Ballyhack.
—	—	—	—	—	—	—	—	" to Belfast.
—	—	—	1	1	—	3	119	" to Duncannon.
—	—	—	1	1	—	3	119	Total.
—	—	—	—	—	—	—	259	Ballyhack to Waterford.
—	—	1	2	3	—	—	1,060	Dublin to Belfast.
—	—	1	—	1	—	—	427	Duncannon to Waterford.
—	—	—	—	—	—	—	29	Kilrush to Limerick.
—	—	—	—	—	—	—	—	Kildysart "
—	—	—	—	—	—	—	—	Glin "
—	—	—	—	—	—	—	—	Portumna "
—	—	—	—	—	—	—	—	Tarbert "
—	—	—	—	—	—	—	—	Kilkee "
—	—	—	—	—	—	—	29	Total.
—	—	—	—	—	—	—	—	Milford to Portrush.
—	—	—	—	—	—	—	145	Belfast to Dublin.
—	—	—	—	—	—	—	—	Londonderry to Mulroy
—	—	—	—	—	—	—	15	Moville to Londonderry.
—	—	—	—	—	—	—	5	Ballina to Sligo.
—	—	—	—	—	—	—	228	Belmullet "
—	—	—	—	—	—	—	—	Westport "
—	—	—	—	—	—	—	233	Total.
—	—	—	—	—	—	—	—	Sligo to Ballina
—	—	—	—	—	—	—	—	Milford to Mulroy.
—	—	—	—	—	—	—	—	Mulroy to Milford.
—	—	—	—	—	—	—	—	Dublin to Waterford
—	—	—	—	—	—	—	—	Leitbeg to Mulroy.
—	—	2	3	5	—	3	2,287	Total

RETURN of the NUMBER of HORSES EXPORTED from IRELAND through GREAT BRITAIN to the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 30TH JUNE, 1915, showing the Ports of Embarkation in Ireland.

Ports.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast,	—	—	—	—
Cork,	—	—	—	—
Dublin,	—	—	—	—
Dundalk,	—	—	—	—
Greenore,	—	—	—	—
Waterford,	—	—	—	—
Wexford,	—	—	—	—
Total,	—	—	—	—

RETURN of the NUMBER of HORSES IMPORTED into IRELAND through GREAT BRITAIN from the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 30TH JUNE, 1915, showing the Ports of Debarkation in Ireland.

Ports.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast,	—	—	—	—
Dublin,	—	—	—	—
Total,	—	—	—	—

RETURN of the NUMBER of HORSES EXPORTED from IRELAND direct to FOREIGN COUNTRIES during the THREE MONTHS ended 30TH JUNE, 1915, showing the Ports of Embarkation in Ireland.

Ports.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Cork,	—	—	—	—
Limerick,	—	—	—	—
Total,	—	—	—	—

DISEASES OF ANIMALS IN IRELAND.

Number of Outbreaks of Swine Fever, and Number of Swine returned as having been Slaughtered in Ireland, under the Diseases of Animals Act of 1894, in the undermentioned period, by Order of the Department.

Quarter ended	Swine Fever.	
	Outbreaks confirmed.	Swine Slaughtered as Diseased or as having been Exposed to Infection.
30th June, 1915, ...	68	393

Number of Outbreaks reported as having taken place, and Number of Animals returned as having been Attacked by Anthrax. Glanders and Foot and Mouth Disease in Ireland in the undermentioned period.

Quarter ended	Anthrax.		Glanders (including Farcy).		Foot and Mouth Disease	
	Outbreaks Reported	Animals Attacked.	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.
30th June 1915,	—	—	—	—	—	—

Number of Cases of Rabies in Dogs in Ireland during the undermentioned period.

Quarter ended	Number of Cases.
30th June, 1915, ...	—

Number of Outbreaks reported as having taken place, and Number of Animals returned as having been attacked by Sheep-Scab and Parasitic-Mange in Ireland in the undermentioned period.

Quarter ended	Sheep-Scab.		Parasitic-Mange.	
	Outbreaks Reported.	Sheep Attacked.	Outbreaks Reported.	Animals Attacked.
30th June, 1915,	58	364	22	42

Veterinary Branch,
Department of Agriculture and Technical Instruction
for Ireland, Dublin.

ACCOUNT showing the QUANTITIES of certain kinds of AGRICULTURAL
into Ireland during each WEEK

ARTICLES	WEEK ENDED 3rd April	10th April	17th April	24th April	1st May
ANIMALS LIVING—					
Horses . . . . . No.	—	—	—	—	—
FRESH MEAT—					
Beef (including refrigerated and frozen), ... cwts.	—	—	—	—	—
Mutton, " " " "	—	—	—	—	—
Pork, " " " "	—	—	—	—	—
Unenumerated, " " "	—	—	—	—	—
SALTED OR PRESERVED MEAT—					
Bacon, ... cwts.	—	—	—	—	—
Beef, ... "	—	—	—	—	—
Hams, ... "	—	—	—	—	—
Pork, ... "	—	—	—	—	—
Meat, unenumerated, Salted "	—	—	—	—	—
Meat, preserved* otherwise than by salting (including tinned and canned), ... cwts.	—	—	—	272	109
DAIRY PRODUCE AND SUBSTITUTES—					
Butter, ... cwts.	—	—	—	—	—
Margarine, ... "	137	288	320	126	—
Cheese, ... "	—	—	—	—	—
Milk, Condensed, . . . "	—	27	21	95	—
" Cream, ... "	—	—	—	—	—
" Preserved, other kinds "	—	—	—	—	—
EGGS, ... gt. hunds.	—	—	—	—	—
LARD, ... cwts.	—	—	—	—	630
CORN, GRAIN, MEAL AND FLOUR—					
Wheat, ... cwts.	47,100	66,200	320,100	47,300	149,800
Wheat, Meal and Flour, . . "	2,500	8,100	32,800	—	14,100
Barley, ... "	—	117,600	600	—	—
Oats, ... "	9,100	13,800	—	—	—
Peas, ... "	—	—	—	—	—
Beans, ... "	—	—	—	—	—
Maize or Indian Corn, . . "	74,700	—	—	126,500	592,000
FRUIT, RAW—					
Apples, ... "	—	—	—	—	—
Currants, ... "	—	—	—	—	—
Gooseberries, ... "	—	—	—	—	—
Pears, ... "	—	—	—	—	—
Plums, ... "	—	—	—	—	—
Grapes, ... "	—	—	—	—	—
Lemons, ... "	—	—	—	—	—
Oranges, ... "	—	—	—	—	—
Strawberries, ... "	—	—	—	—	—
Unenumerated, ... "	—	—	—	—	—
HAY, ... tons,	—	—	—	—	—
STRAW, ... "	—	—	—	—	—
MOSS LITTER, ... "	—	—	—	—	—
HOPS, ... cwts.	—	—	—	—	—
VEGETABLES, RAW—					
Onions, ... bushels,	—	—	—	—	—
Potatoes, ... cwts.	—	—	—	—	—
Tomatoes, ... "	—	—	—	—	—
Unenumerated, . . . value £	—	—	—	—	—
VEGETABLES, DRIED, . . . cwts.	—	—	—	—	—
Preserved by Canning, . . "	157	—	—	—	—
POULTRY AND GAME, . value £	—	—	—	—	—

*This Table is confined to the Imports of certain kinds of Agricultural Produce into
to a request from this Department kindly consented to separate the Irish Imports (direct)
form of Weekly Returns.

Produce imported direct (i.e., from the Colonies and Foreign Countries) of April, May, and June, 1915.*

Week Ended							
8th May	15th May	22nd May	29th May	5th June	12th June	19th June	26th June
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	43	21	—	—	—
—	—	—	—	—	—	—	—
—	—	306	—	355	—	12	—
—	—	—	—	—	—	—	—
78	107	50	127	245	46	29	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	225	—
21,300	8,600	179,300	75,900	432,700	40,000	149,100	26,900
1,900	15,300	—	17,500	25,500	—	7,900	2,500
—	58,600	59,800	—	—	—	32,700	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
211,800	102,800	109,200	119,100	133,000	108,600	222,200	182,000
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	268	—	—	—	—	—
—	—	—	—	—	—	—	—

Ireland from the Colonies and Foreign Countries. The Board of Customs have in answer from those of the United Kingdom, and to supply this Department with them in the

Statistics and Intelligence Branch,
Department of Agriculture
and Technical Instruction for Ireland.